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THE WELDING ENGINEER

MAY 1952

Mounted on a boom, welding head can travel 34 ft horizontally with a vertical lift of 16 to 20 ft. Story on pages 37-39

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Clyde B. Clason — *Managing Editor*
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Jack I. Medoff — *Contributing Editor*
George B. Byrant, Jr. — *Chief Washington Bureau*
Russell F. Anderson — *Editor World News*

F. P. Di Toro
Eastern Manager, New York, Tel. LOngacre 4-3000

E. J. McOsker
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Tel. Superior 1-7000

Thomas H. Barry
Western Manager, Chicago, Tel. Whitehall 4-7900

Joseph H. Allen, Jr.
1111 Wilshire Boulevard, Los Angeles, Calif.
Tel. MAdison 6-4323

John W. Otterson
68 Post Street, San Francisco, Calif.
Tel. Douglas 2-4600

James Cash
First National Bank Bldg., Dallas, Tex.
Tel. Prospect 7-5064

John Doyle
Business Manager

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One-piece molded plastic shell swings on adjustable friction pivots

To replace, cover glass slides out without disturbing the filter lens

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NEWS FROM WASHINGTON

Calcium Carbide Goal Boosted 450,000 Tons

EXPANSION goal for calcium carbide production is now 1,230,000 short tons by Jan. 1, 1954. This is an increase of 450,000 tons over production on Jan. 1, 1951, according to Ralph S. Trigg, deputy administrator of the Defense Production Administration for program and requirements.

Not only is a large tonnage of calcium carbide needed for oxy-acetylene welding, flame-cutting and flame-scarfing in the metalworking industries, says NPA, but its use in plastics and chemical fields is zooming. Such strategic chemicals as vinyl acetate, vinyl chloride monomer, trichlorethylene, acetic acid and its derivatives and neoprene also come from acetylene.

New Regulation Hits War Contract Profits

RENEGOTIATION pitfalls into which the unwary may tumble are considerable. Any contractor whose government business exceeds $250,000 per year is liable to renegotiation. Likewise any broker selling to the 16 government agencies whose take is over $25,000 yearly is liable to renegotiation if he is not a regularly paid employee of the manufacturer whose product he sells.

Subcontractors up to the third and fourth tiers are also liable for renegotiation if a direct defense use of their products can be shown.

Titanium Production Will Be Increased

TEN TONS of titanium per day is the hoped for production goal, according to Department of Commerce figures. At present, only two companies are producing this new lightweight high-temperature alloy, although quite a few are fabricating it. However, a new plant, expected to be operating by late 1952, will be able to produce up to 3,600 tons annually when it hits its stride.

100% Nickel Rods Out for Long Time

NICKEL will continue to be short for an indefinite period because of the large quantities that are being used by the atomic and jet-aircraft programs. Current supplies are not enough, so the government is being forced to draw from the stockpile continually. Result: No relief in sight for present scarcities of alloys such as 25-20 stainless and the high-nickel alloys of other types.

Government authorities do not look for the situation to improve even after the new nickel plant in Cuba starts producing 2,000,000 pounds annually.

NPA Metalworking Headed by Ralph Howe

NEW DIRECTOR of the Metalworking Equipment Division of NPA is Ralph S. Howe, executive vice-president and director of the New Britain Machine Co., New Britain, Conn.

Mr. Howe, in his first government job, succeeds Swan Bergstrom of Cincinnati, who has completed a six-month tour of duty under NPA's policy of rotating division directors. Such rotation gives industry-experienced executives an opportunity to serve in the mobilization effort.

Remove Zinc Controls, Ask Primary Producers

REVOCATION of zinc order M-9, under which allocation and use of the metal is controlled, was recommended to NPA by the primary zinc producers' industry advisory committee.

The amount of zinc now available in this country exceeds the current rate of consumption with respect to overall tonnage, said industry representatives. Some 969,000 tons of primary and secondary zinc will be available during 1952, with consumption estimated to be 35,000 tons less.

Steel Seizure Was Not without Precedent

RECENT action of the Administration in taking over the steel industry in order to avert a threatened strike brings to mind that this action was not without precedent. Since June 9, 1941, the government has taken over privately owned properties 71 times. The seized businesses have included coal mines, aviation, trucking, railroads, a mail order house and now the steel mills. Next?

High-Priced Copper Boosts Output

CONTINUED production of copper for defense needs will come from an Arizona mine that can't operate in ordinary times because of high operating costs. This copper will come from the Christmas Mine, in Gila county, Arizona. Government-guaranteed price for the metal is 31.6 cents per lb, compared with the ceiling price of 24.2 cents, f.o.b. refinery.

The overceiling price agreement was negotiated by the Defense Materials Procurement Agency with the Sam Knight Mining Lease, Inc., for a two-year period. Current rate of production at the mine is 1,195,000 lb of electrolytic copper per year.

Four overceiling copper price agreements, involving the continued use of seven mines, have been entered into by DMPA. Total production of these mines during the life of the contracts will approach 33,000,000 lb.

21,854 Tons of Tin Used to Make Bronze

FROM the postwar high of 1950, the United States' consumption of tin declined 13% in 1951. The use of tin increased in the manufacture of bronze, where 21,854 tons were used, but declined in solder, tinplate and tinning.

The drop was due to the restric-

NEWS FROM WASHINGTON (Continued from page 5)

tions imposed by NPA. Consumption was favored by the high recovery of scrap and by the use of 1,431 tons of copan alloy, which is not subject to restrictions like pig tin. Copan is a by-product of tin smelting and contains about 85% tin.

Three H's to Benefit from Increased Steel

HOUSING, highways and hospitals are on the list of construction projects that will receive increased steel allotments now that the strike has been averted, according to authoritative government sources. The National Production Authority plans to raise the self-authorization limits for structural steel. This automatically relieves the builder or contractor of the project of the necessity of applying to NPA for an allotment.

Pirating of Men Gets Investigated

OFFICE of Salary Stabilization directors are sending investigators into a dozen cities to investigate the hiring practices of certain engineering firms. Some firms are making a practice of hiring engineers away from their employers and then selling their services back at several times the original salary. The employee earns two to three times his original income, and the pirating firm also gets a substantial cut.

"According to information reaching us, the entire defense effort is being impaired," commented Joseph D. Copper, executive director of the Office of Salary Stabilization.

Copper Use Reaches All-Time High Level

THAT red metal, copper, showed an increased consumption of 106,000,000 pounds in 1951 over 1950, according to National Production Authority figures. The year 1951 thus reached an all-time high in copper use. Heavy demand from both defense and non-defense industries has necessitated the withdrawal of substantial quantities from the stockpile.

To alleviate the shortage, two kinds of control with respect to raw copper supplies and copper and copper-base materials are operated. Raw copper materials, refined copper and scrap are NPA-controlled, but sheet, strip, rod, bar and wire stock of copper and copper-base alloys are under CMP control, according to Paul B. Andrews, acting director of the division.

Steel Decontrol Held up by Strike

A STEEL industry advisory committee has been appointed to make recommendations for control or decontrol of steel, but its report has been held up by the impending strike. General feeling in Washington is that with the strike averted most controls on steel will be off soon.

Naturally, any steel decontrol would depend, to some extent, upon an improvement in the scrap situation. For months now the mills have been operating on a 15-day supply whereas ordinarily they have a backlog of 50 days or more. However, the situation is not hopeless as it is believed that there are millions of pounds of scrap metal just waiting for someone to deliver it to the steel mills.

Hardship Account Helps Small Business

JAMES L. KELLY, assistant administrator for small business of the National Production Authority, has approved 122 applications for supplemental allotments of controlled materials for the second quarter. The 214 cases approved to date cover requests for all items of controlled materials, with aluminum and copper brass mill products in greatest demand. Altogether, 2,805,715 lb of aluminum and 1,005,375 lb of copper brass mill products were approved by the review panel and allotted to approved applicants. Metal doors, sash and trim, metal office furniture and specialized lighting equipment are some of the products manufactured by applicants.

After April 2, the Hardship Account will probably be low, Mr. Kelly warned, and anyone who applies after that date is going to have to take a chance on a considerably depleted stock.

More Red Tape for Small Tin User

TO IMPROVE the effectiveness of use limitations by small users of tin, NPA has amended its order M-8 to require more exact certification. A small user of tin is defined as one who buys 6,000 lb or less per month, according to W. L. Raup, chief of NPA's tin section.

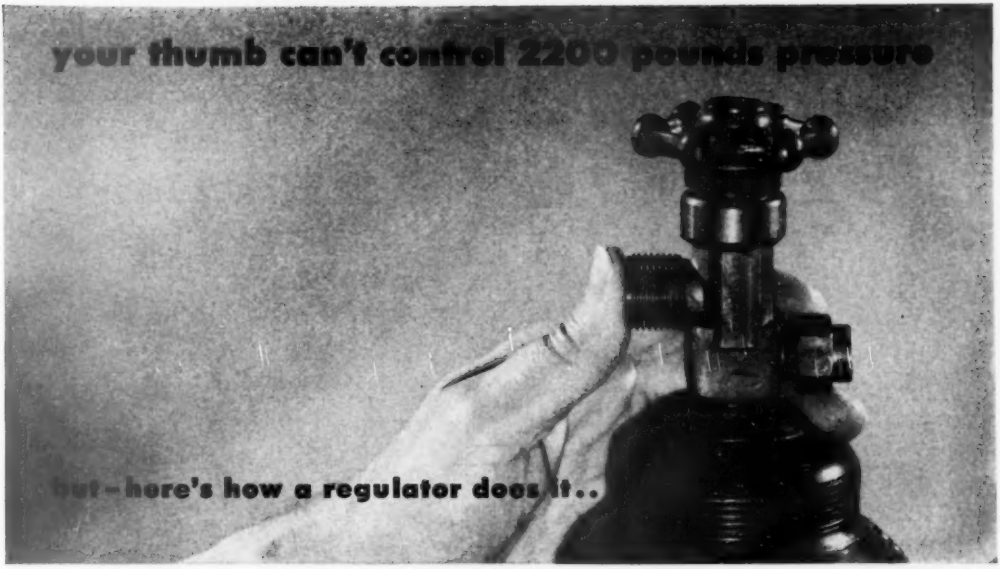
Bronze welding rod which contains a maximum of 10% tin is covered in this order. Many types of solders are also listed in the schedules.

Some small users have overlooked the use limitation in the tin order, which restricts their quarterly use of pig tin to 90% of their average quarterly consumption during the base period Jan. 1 to June 30, 1950.

Provisions of M-8 requiring certification by users of the end use of the material are revised in the new amendment. The user must show that receipt of his shipment of pig tin for a month will not be in violation of a 60-day inventory limitation; that no allocation authorization for the month has been issued by NPA; that his total receipt of pig tin in that month, including the shipment being certified, will not exceed 6,000 lb; that his total use of pig tin in that month will not exceed his permitted use and that it will be used only for purposes permitted in the schedules shown in M-8.

A certification covering the sale, delivery purchase or acceptance of pig tin, secondary tin, solder, babbitt or other alloys containing 1.5% tin is revised also. Users must now certify that such alloys will only be used as specified in the schedule.

Further information on the amended M-8 order can be obtained from any Department of Commerce field office.



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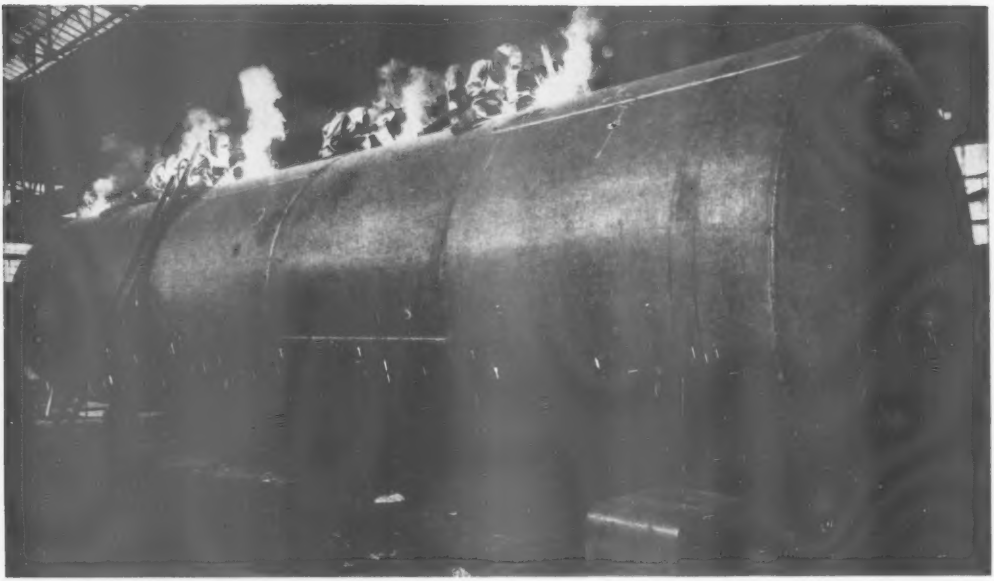

WORTHINGTON TURNING ROLLS IN OPERATION move this big tank at exactly the right speed for the most efficient downhand welding. This equipment often increases output as much as 50% because downhand welding with heavier electrodes does the job with one pass instead of two or three.

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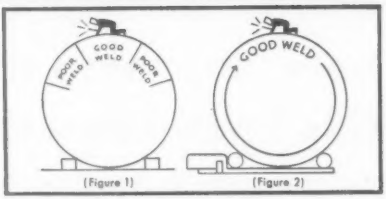

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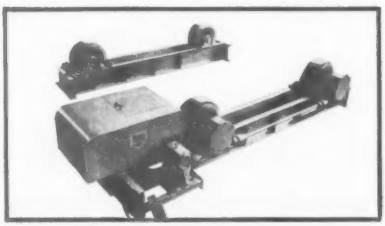
Unless the work is turned continuously, good downhand welding is obtainable only in small area (Fig. 1). With a Worthington Turning Roll, downhand welding is assured for the complete circumferential seam (either by manual or automatic welding) (Fig. 2).



WORTHINGTON'S LOW-SLUNG DRIVE MECHANISM permits unobstructed loading from either end of turning rolls. The high-efficiency and smooth operation of Worthington power rolls (lower right) and idler rolls (upper left) result from long and varied experience in building equipment for welding cylindrical vessels.

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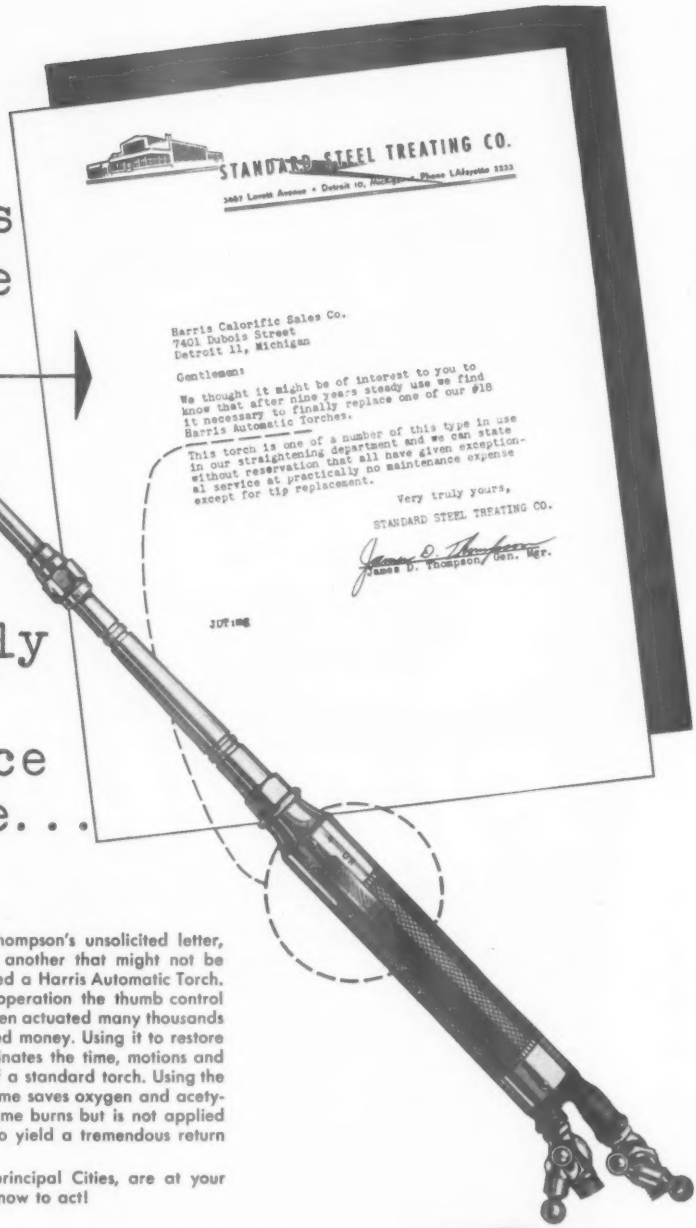
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practically no maintenance expense...

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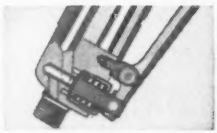

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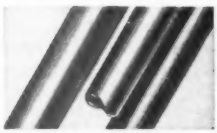

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Rugged Head, with protected threads, assures long life, low maintenance. Faster, safer, non-flash tip-mixing principle. Accurately swaged tips assure unrestricted flow of gases, actually toughen with use.

The heavy duty cutting torch that gives faster, cleaner cuts...longer, more economical service

There's no other torch on the market with all the work-saving, time-saving, money-saving features of the "Torchweld 75". It's designed better, and built better, to do better work for you.

Time after time in shops, foundries and metal salvage yards—where heavy work and rough use is the rule—it's the "75" that's preferred. Yet despite its ruggedness, the "75" performs with knife-like precision. It cuts clean edges with an absolute minimum of kerf. It cuts faster. It cuts easier.

All this means savings for you—savings in working time, in materials, in gas and in maintenance costs—savings that add up to an impressive figure during the "75's" long useful life.

Get the "Torchweld 75" from your nearest NCG office or your NCG authorized dealer. Or write for Catalog NTW-110 for complete details on this and other quality Torchweld cutting and welding apparatus.

NCG®

EVERYTHING FOR WELDING

Write for Catalog NTW-110

NATIONAL CYLINDER GAS COMPANY

Executive Offices:

840 North Michigan Avenue • Chicago 11, Illinois

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A.O.Smith

AC WELDING MACHINES

P.O. Box 584, Milwaukee, Wisconsin

A. O. Smith CERTIFIED Welding Electrodes
—the standard of dependability since World War I

three

In ~~two years'~~ continuous operation on a three-shift basis, these 116 A.O. Smith Heavy Duty AC Welding Machines on this auto frame line have set an amazing record of *dependability in production.* Designed and built for extreme requirements, they have accumulated nearly ~~15,000~~ hours per machine—a rugged *in-service* life-test at duty cycles up to 82%! 23,000

More than ~~1,000,000~~ auto frames were built in this period . . . more than ~~4,000,000~~ 1,500,000 pounds of weld metal deposited by the Welding Machines shown here—*without a shutdown* caused by welding equipment failure! 6,000,000

The A. O. Smith Heavy Duty AC Welding Machine has *proved in use* that it will stand up under service which punishes most welding machines. We rely on it to turn out thousands of tough welding jobs—from truck frames to giant pressure vessels.

And you can rely on it for long, trouble-free service, power savings, easy operator acceptance. But *you* be the judge . . . try the welder MADE BY WELDERS *FOR* WELDERS.

WRITE, WIRE or PHONE for the name of your nearest distributor.

made By welders
...For welders!

Welding Info-Aids

201 VERTICAL GRINDER—The Aro Equipment Corp. Two well-illustrated bulletins, 1274 and 1284, tell about Aro "Brute" heavy-duty vertical grinders as well as other models of high-speed and production grinders and sanders.

202 WELDING FLANGES—Harrisburg Steel Corp. 32-page, two-color catalog pictures and completely describes drop-forged pipe and steel flanges and steel welding neck flanges. List prices and weights are tabulated as are physical and chemical properties.

203 HARD-FACING CATALOG—Rankin Mfg. Co. 8-page catalog tells what hard-facing can do for companies having severe abrasion, impact and wear conditions in their work. Rods, application procedures, hardness numbers and other information fill out the excellent discussions.

204 APPLICATOR BARS—Stulz-Sickles Co. 4-page bulletin explains savings and wear advantages gained by using "Manganal" special shape applicator bars for tractor grousers. Welding instructions and hints for bulldozer blades, track rollers, etc., are also given.

205 OXYGEN REGULATORS—National Welding Equipment Co. 44-page brochure is a complete but concise explanation of the how, why and what of gas regulators. Easy-to-read text and unusually well-planned illustrations combine to make it valuable to student and engineer.

206 WELD GRINDING—Universal Wheel & Abrasive Corp. 78-page catalog gives complete information on Universal wheel markings, types of wheels, bonds, arbor hole allowances, special wheels and mounted points.

207 PROTECTIVE SLEEVES—A & A Mfg. Co. 4-page, two-color bulletin AH-2 tells all about "Gortite" neoprene sleeves and boots for protecting hydraulic piston rods, lead screws, worm drives, etc., from grit, chips, water and oil.

208 AC-DC ELECTRODES—Champion Rivet Co. Two pocket-size folders give specifications and applications for "Graydac" and "Tan Devil" E-6013 welding electrodes for a-c/d-c general purpose work.

209 PORTABLE CRANE—Grand Specialties Co. 4-page folder L-8-51 tells about portable shop cranes for handling motors, castings, dies and other heavy loads. Capacities and dimensions of various models are given.

210 WELDING CLOTHING—Safety Clothing and Equipment Co. Small folder describes "Gardwell" welding gloves, aprons, jackets, sleeves, armlets, leggings, etc.

CARDS NOT GOOD AFTER AUGUST 1, 1952

TO OBTAIN: (1) manufacturer's catalog or bulletin described on this page; information on (2) a new product item or (3) an advertised product, use the card sections printed below. Insert number of catalog or new products item or page number of advertised product (add initials of the advertiser if more than one ad appears on the page). THE WELDING ENGINEER will ask manufacturers to send the information requested.

Each card section must be completely filled out. Do not use ditto marks. These cards are not good after Aug. 1, 1952.

How to obtain information on an advertised product:

Write page number of ad—plus advertiser's initials if there is more than one advertisement on the page

Number or page number → 97-ASME
Name John Smith
Company Rex Mfg. Co.
Address 3217 Lewis Ave.
Chicago 16, Ill. Title Engineer
THE WELDING ENGINEER

How to obtain manufacturers' literature or new product information:

Write in number of item

Number or page number → 231
Name John Smith
Company Rex Mfg. Co.
Address 3217 Lewis Ave.,
Chicago 16, Ill. Title Engineer
THE WELDING ENGINEER

Number or page number →
Name
Company
Address
Title
MAY, 1952 THE WELDING ENGINEER

Number or page number →
Name
Company
Address
Title
THE WELDING ENGINEER, MAY, 1952

Number or page number →
Name
Company
Address
Title
MAY, 1952 THE WELDING ENGINEER

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THE WELDING ENGINEER, MAY, 1952

Place 2c Stamp Here

THE WELDING ENGINEER
520 NORTH MICHIGAN AVE.
CHICAGO 11, ILL.

211 COAL MINE WELDING—Eutectic Welding Alloys Corp. 14-page booklet TIS No. 767 provides many pictures and applications of the use of "Low Temperature Welding Alloys" in repairing cast iron, alloy steel, chains, tools, pumps, buckets, rails, motors, and compressors.

212 RUSTPROOF SOLUTION—Octagon Process, Inc. 4-page two-color bulletin on "Rustshield 2," tells how it produces an oil-retaining rustproof surface for moving metal parts.

213 SPOT WELDING AIRCRAFT—Sciaky Bros., Inc. 6-page two-color bulletin on spot and seam welding aircraft components shows Sciaky welders in action on parts for the F-89 all-weather night fighter.

214 METAL BENDER—Connors & Davis Sales Corp. 6-page, two-color Catalogue No. 15 shows bending, folding, shaping and duplicating uses of the "Bendit" metal forming machine. Adaptability for short-run production is explained and clear pictures show clamping and bending mechanisms. Arrows point out each part's function.

215 X-RAY DIFFRACTION — North American Philips Co., Inc. 8-page booklet, "What is X-Ray Diffraction," tells uses of this equipment for non-destructive analysis of metals, plastics, oils, chemicals, etc.

216 MAGNAFLUX INSPECTION — Magnaflux Corp. Two booklets titled "Profit or Loss" and "Magnaflux Field Inspection Service" tell the story of the six types of inspection tools made by the firm. Included are magnetic particle, fluorescent particle, ultrasonic, filtered particle and brittle coat methods.

217 INERT-ARC FOR STEEL—Linde Air Products Co. 12-page booklet deals with the new subject of inert-gas metal-arc welding of carbon steels. Topics covered are gas flow, current density, welding speed, porosity, deposition rates and penetration.

218 HEAT INDICATORS—Tempil Corp. Supplementary instruction sheet covers in great detail the recommended use of "Tempilstiks" in industrial and research jobs. Topics covered include attained temperatures of moving pieces, heat distribution, etc.

219 TOOL STEEL WELDING—Alloy Rods Co. New 8-page, two-color bulletin full of illustrations describes "Tool-Arc" electrodes for welding tools and dies. Special sections are devoted to air-hardening, oil-hardening, water-hardening, high-speed, hot work and other classifications of tool steels.

220 R-W ELECTRODES—P. R. Mallory & Co., Inc. 10-page "product index" provides condensed information on Mallory batteries, capacitors, contacts, rectifiers, resistors, switches, vibrators, resistance welding alloys, metals and ceramics.

221 METAL CLEANING—Oakite Products, Inc. Pocket-size booklet advises on "Eight Things to Look for When You Wash Metal by Machine." Specific cleaners and methods are recommended.

222 INERT-ARC WIRE—Aluminum Wire Products Co., Inc. 4-page folder describes aluminum alloy welding wire specially manufactured for inert-arc welding. Called "Clean Weld" wire, its surfaces are free from dirty oxides and other soils.

223 ZINC DIE WELDING—Eutectic Welding Alloys Corp. Reprint tells how Kirksite dies and other zinc die castings can be repaired without melting the parent metal. A special Eutectic alloy's application to these metals is pictured and described.

224 FLEXIBLE GRINDING WHEEL—Norton Co. 4-page, three-color bulletin on Norton reinforced hub grinding and sanding wheels gives job recommendations, wheel selections, stock sizes and list prices.

225 HARD-FACING ALLOYS—Victor Equipment Co. New series of colorful bulletins gives sizes, applications and prices of Victor hard-facing alloys, Victorite, Victortube, Tungsmooth, Victoralloy and special wires for automatic hard-facing.

226 WELDING FLUX—Special Chemicals Corp. Single-sheet bulletin provides quick review of applications and operating characteristics of "Kwikflux" for welding and hard soldering ferrous and nonferrous metals.

227 ELECTRODE DRYING OVEN—Grieve-Hendry Co., Inc. Description and specifications for the Model TD portable electric oven show how it keeps low-hydrogen electrode coatings in top shape for elimination of under-bead cracking, etc.

228 WELDING ACCESSORIES—General Electric Co. 4-page illustrated bulletin GEC-864 pictures and describes more than a dozen electrode holders, ground clamps and connectors and gives important data for each.

229 POWER CYLINDERS—Hanna Engineering Works. 6-page two-color folder, "Cylinder Power in Action," shows by sketch and actual photo how air and hydraulic cylinders can be used with levers, toggle, cams, cables, shafts, gears and direct loads.

CARDS NOT GOOD AFTER AUGUST 1, 1952

Insert number of catalog or new products item or page number of advertised product (add initials of advertiser if more than one ad appears on the page). Fill out each card section completely—do not use ditto marks.

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THE WELDING ENGINEER

520 NORTH MICHIGAN AVE.

CHICAGO 11, ILL.

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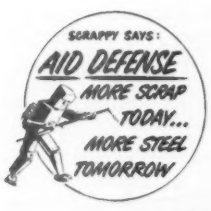
THE WELDING ENGINEER, MAY, 1952

Grandpa Never Threw a Thing Away



It's only human to want to hold on to things after they've outlived their usefulness. That's why today millions of tons of worn-out and obsolete equipment and machinery are lying forgotten in the country's plants and factories and on farms.

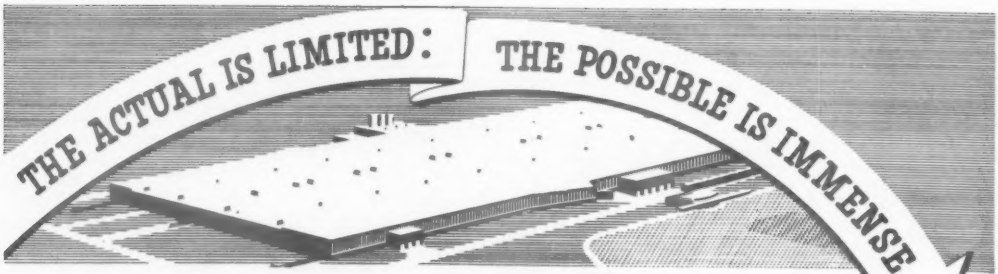
The steel industry needs these millions of tons of dormant scrap, needs it in the worst way. With this vital dormant scrap the entire steel supply picture would brighten up, with more steel for everybody. But without it, the steel industry cannot hope to keep up production at present levels.

Call in a scrap dealer now, today. He will buy your dormant scrap and start it moving toward the steel mills.

BETHLEHEM STEEL

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

More Scrap Today... More Steel Tomorrow



NEW LINCOLN PLANT CREATED BY INCENTIVE-INSPIRED CO-ACTION IN DEVELOPING POSSIBILITIES IN PRODUCT

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HOW TO GUARANTEE STEEL DESIGNS

ALWAYS specify Standard Procedure Welds on all designs. Such foresight insures reliable strength, with minimum weld metal . . . at minimum cost.

With standard welding procedures, physical properties of the weld metal match the parent steel for strength, for ductility, for resistance to fatigue, impact and corrosion. Resulting welds are also uniform in hardness and can be machined at the same speeds and feeds as the steel itself.

Lincoln's "Fleetwelding" Bulletin 444 gives latest data on correct currents, electrodes and speeds for Standard Procedure welds. Available to designers and production engineers by writing on your letterhead to Dept. 85, THE LINCOLN ELECTRIC COMPANY, Cleveland 17, Ohio.

Solid, one-piece construction—*Standard procedure welds fuse parts together to give complete continuity to product detail.*

Ductile—*Welds duplicate properties in mild steel to resist shock and impact . . . permitting lower safety factors in design.*

Strong—*Even welds made deliberately inferior in quality are stronger than parent steel members.*

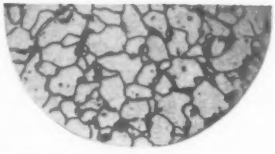
MECHANICAL STRENGTH

	Available in Welds	Used by Designer
Tension	70 to 80,000 psi	15 to 20,000 psi
Compression	80,000 psi	15 to 20,000 psi
Shear	50,000 psi	10 to 15,000 psi

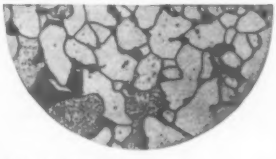
HOW TO DESIGN FOR STEEL

Complete training course for designers and production engineers now available for presentation in your plant. Send for complete details.

TODAY'S WELDS ARE STRONG, DEPENDABLE



WELD METAL



MILD STEEL

CAST IRON

The photomicrographs show why welded steel is superior to gray iron. Fine grain sizes for both steel and weld metal account for steel's greater strength as compared with the graphite flakes that limit tensile properties of iron.

MORE FACTS ABOUT WELDED STEEL

Machine Design Sheets available on request. Designers and Engineers write on your letterhead to Dept. 75.

THE LINCOLN ELECTRIC COMPANY

CLEVELAND 17, OHIO

The World's Largest Manufacturer of Arc Welding Equipment

ESTABLISHED 1916 THE WELDING ENGINEER MAY, 1952

Not for Know-It-Alls

MAY IS a big month for welding distributors. Several hundred of them from all parts of the country will be meeting in Chicago May 5-7 for the eighth annual meeting of the National Welding Supply Association. Those who attend will benefit greatly, as is the case with all NWSA meetings. Unfortunately, the welding distributors who have the most to learn probably won't be among those present.

It is a sad truism that the less a man knows, the more inclined he is to feel that he knows it all. An old Arabian proverb puts it very well. It goes, as I recall it:

He who knows and knows that he knows is wise—follow him.

He who knows and knows not that he knows is asleep—waken him.

He who knows not and knows that he knows not is a child—teach him.

He who knows not and knows not that he knows not is a fool—shun him.

The majority of human beings, I fear, seem to be in class four, and this, unfortunately, includes many welding distributors. You can't give advice to class four characters because they already know it all. For that reason, they won't be reading this page, which is a pity as they might benefit from it.

IN OUR present economic system, the distributor has a definite function to perform: that of getting products sold. The shortages created by the war years, the postwar buying spree and the new demands of the Korean incident and rearmament have caused some distributors to forget their primary function. From salesmen, they have degenerated into mere order takers.

Today, a distributor may be able to make a living by sitting around and waiting for the phone to ring, but there is no reason to expect that the condition will continue indefinitely. Even today, many of the office sitters would be amazed if they would go out and try to do a job of selling. After they had worn off some of the fat, they would find profits coming their way that they had never anticipated.

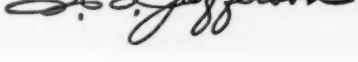
Many distributors allow, if they do not encourage, their salesmen to make a humble hat-in-the-hand approach and ask the customer if he wants to buy any welding supplies today. This is entirely the wrong attitude. The customer should be taught to use welding to its fullest extent. How many distributors have ever gone in and sold new applications of welding? Yet a little ingenuity along these lines might easily double a distributor's volume.

SOME distributors display a sort of misplaced ingenuity. Their aim is to talk the customer into buying what they handle, regardless of whether it fits or not. For instance, the job might call for spot welding, but the distributor suggests arc welding because he handles no resistance-welding equipment. Will the customer be satisfied and pleased? Or will he feel that he has been sold a "bill of goods" and be sour and unhappy over this lemon?

Welding has often gotten a black eye because some eager-beaver salesmen sold the wrong process for the particular job. It will be hard to reconvert these disgruntled customers.

Some distributors are price cutters. They feel, like the clothing-store proprietor in the old story, "Even if I'm not making any money, just look at the volume I'm doing!" Recently, I wrote an editorial saying that electrode prices might be too low. Several distributors wrote in to say that they agreed with me, but if prices were raised then their competitors (apparently satisfied to be making little or no money) would again slash the margin of profit. Good welding distributors are thus being penalized because of the faulty, slipshod and ignorant methods pursued by their competitors. It happens all too often.

The distributors who come to Chicago will learn how to do a better sales job. Unfortunately, they do not need the lesson so much as the know-it-alls, who just won't be taking advantage of this splendid opportunity.



Blueweld LO-HYDROGEN ELECTRODE STABILIZER

Insures Low-Hydrogen Welds Against Defects Caused by Moisture-Laden Shielding

- Keeps Low Hydrogen Electrodes *Truly* Low Hydrogen.
- *ARIDAIR Intake Breather* (Patent Pending) chemically dehydrates incoming air; *Only Moisture Free Air* enters.
- *Chimney Type Ventilation* — Electrodes always surrounded by *Moving, Heated, Dry Air.*
- *Dehydrating Chambers* limit depth of electrode piles to 1.25" to improve dehydrating efficiency.
- *Temperature Thermostatically Controlled* — Adjustable from 250° to 600°F.

Immediate Shipment on D.O. Rated Orders
Specify 110 or 220 Volt Current.

Blueweld Model 400 S.E.A. Stabilizers may be stacked or grouped to meet varying capacity requirements. Each unit individually heated — capacity readily and economically adjusted.

Fred C. Archer, Inc.
MANUFACTURER
606 WEST WISCONSIN AVENUE
MILWAUKEE 3, WISCONSIN

SPEAKERS' table, left to right: Andre Lot, Canadian Liquid Air Co., Ltd., Montreal; A. J. Fausek, Modern Engineering Co., St. Louis; J. J. Lincoln, Jr., Air Reduction Sales Co., New York; Clarence E. Manion, dean of College of Law, Notre Dame, the guest speaker; and Governor Henry F. Schricker, who also addressed the meeting

52nd IAA Meeting Was Good

Sacred cow takes beating at the Indianapolis convention. Members of International Acetylene Association learn what we must do to save ourselves from Communism.

BY CLYDE B. CLASON

THE 52nd annual convention of the International Acetylene Association got off to a flying start on Monday March 31 with one of the best luncheon addresses ever delivered at any convention. The guest speaker was Clarence E. Manion, dean of the College of Law, Notre Dame University, and author of *The Key to Peace*, a recent book that has attracted nation-wide attention.

Why, Dean Manion inquired, is it that we are periodically forced to switch from the making of baskets and bottles and beer to the making of battleships, bombs and bullets? The answer lies in the faulty miscalculation of our political and social scientists, who know nothing of the materials with which they deal and have no certain convictions of their procedures. Until certainty and conviction appear in the political and social sciences, all our efforts towards peace are doomed.

The Government Cow

Dean Manion bitterly attacked what he termed the "cow concept" of government—"a monstrous cow feeding off somewhere in the stratosphere with a great big teat for everyone who is hungry." Because our political scientists do not know what government is, what it is for, all their structures collapse. That's our whole trouble, and it's our only trouble.

A concentration of governmental power always precedes the death of freedom. "Where the state swells, the people shrink." This unhealthy swelling indicates a national sickness. We are losing the desire to govern ourselves, and the inevitable result is Communism, the ultimate form of all Big Government.

The triumphs of Communism, the speaker pointed out, have not been won on the battlefield. Invading armies and force of arms have played a minor role. The communists took Jugoslavia with Jugoslavs, Hungary with Hungarians, Czechoslovakia with Czechs and China with Chinese. They confidently expect to take America with Americans—and they are doing it.

The only successful way for us to fight Communism is to "demobilize and immobilize the evil and immoral concentration of power" within our own house. We must, stressed the speaker, invade the fields of doubt and agnosticism and restore the lost convictions upon which our Republic was founded. The four cornerstones, either expressly stated or implied in the Declaration of Independence, are:

1. That all men are created. This implies the existence of a Creator.

2. That all men are created equal. "Equal" in this sense means equality before God and before the law.

3. That all men are endowed by their Creator with certain inalienable rights: life, libery and the pursuit of happiness.

4. That to secure these rights, governments are instituted among men, deriving their just powers from the consent of the governed.

Today, our government has swept out of the channels designed to hold it to the purposes for which it was created and to no other purposes. It has magnified itself by the usurpation of many illegitimate powers. Government on the loose is a conflagration. It will take courage to attempt to stop it, but the land of the free is the home of the brave—never the home of the appeaser or the coward.

The IAA luncheon, held at the Claypool Hotel, Indianapolis, was attended by 380 members and guests. Other speakers on the program were the Honorable Henry F. Schricker, governor of Indiana, and the Honorable John R. Barney, controller of the City of Indianapolis, both of whom gave brief welcoming talks.

L. W. HENCH, new president of the International Acetylene Ass'n.

CHARLES NESS (left), of Linde's acetylene research laboratory, receives the 1951 Morehead Medal from Claude E. Monlux, IAA past-president

L. W. Hench, president of the American Oxygen Service Corp., Harrison, N. J., acted as chairman of the meeting, and James W. Dunham, vice-president, National Cylinder Gas Co., Chicago, delivered the annual address of the IAA president.

Ness Wins Morehead Medal

Another feature at the luncheon meeting was the presentation of the 1951 James Turner Morehead Medal to Charles Ness, superintendent of the acetylene research laboratory, Linde Air Products Co., at Speedway, Ind. The award was made to Mr. Ness for his "many contributions to design for safety, efficiency and economy in the generation, pipeline distribution and packaging of acetylene." The medal was bestowed by Claude E. Monlux, past-president and a director of the International Acetylene Association and a vice-president of the Linde Air Products Co.

Mr. Ness is the 26th recipient of the Morehead Medal, established in 1922 by John Motley Morehead in honor of his father, the late James Turner Morehead. Since Mr. Ness joined the Linde Air Products Co. in 1919, he has been concerned with filler materials for acetylene cylinders. Under his direction, a monolithic-type filler was approved and put into production. More recently, a sand-lime type of filler was developed, perfected and put into production under his direction.

Following the luncheon, two afternoon technical sessions were held: on engineering and chemistry. Professor P. W. Case, mechanical engineering department, Purdue University, and R. F. Flood, district manager, Linde Air Products Co., Indianapolis, served as session co-chairmen of the engineering session. Three excellent papers were presented.

J. A. Ritter, superintendent, unit and water heater division, Servel, Inc., Evansville, Ind., talked on the welding of light-gage tubing in the manufacture of household gas refrigerators. At the present time, Servel is making 125,000 welds a day, of which about 100,000 are oxyacetylene welds. One refrigeration unit requires 85 pressure-tight welds and 60 tack welds.

The process used is oxyacetylene welding with an iron filler rod. Soldering, brazing and braze welding are all ruled out because of the corrosive properties of the ammonia refrigerant. It has been found that even a tack weld made with brazing rod will leak due to the alloying of the copper with the steel.

Servel's best and most experienced weldors are used as repair weldors to clean up and close the leaks found by the soap-test procedure. A final and very rigid leak test is made after repair by wrapping the welds with a piece of moistened paper treated with a chemical that reacts in the presence of ammonia. Any leak, regardless of how small, will allow the ammonia vapor to seep through and turn the white paper to a reddish-pink at the point of the leak.

W. D. Waldron, welding supervisor of the Seaboard Air Line Railroad Co., Jacksonville, Fla., read a very comprehensive paper on oxyacetylene welding and cutting applications on the Seaboard railroad. These vary from simple heating operations to automatic shape cutting and on up the scale to the fabrication and reclamation of Diesel-engine alloy components that must operate in hard service. Welding conditions and routines must be carefully followed in all this work.

A "Flame Punch"

Production cutting and flame-hardening at the Jeffrey Mfg. Co., Columbus, O., were discussed by Archer B. Jones, welding foreman of that concern. Mr. Jones described a novel "flame punch" that was developed to produce more or less standard-size holes in plate running from ¼ to 1 in. in thickness. The flame-cut holes can be compared favorably with punched holes as to size and roundness. The development of this specialized flame equipment has ended the transportation of bulky and heavy plates from the cutting department to the structural department for hole punching.

The chemistry session was chairmanned by Dr. F. E. Cislak, director of research, Reilly Tar and Chemical Co., Indianapolis, and Dr. F. R. Balcar, coördinator, research and engineering department, Air Reduction Co., Inc., New York City. Papers on the chemical uses of acetylene were given by Dr. H. S. Sutherland, vice-president, Shawinigan Chemicals Ltd., Montreal, Canada; W. H. Ayscue, sales supervisor, rubber chemicals division, E. I. duPont de Nemours and Co., Inc., Chicago; and Clayton Ruebensaal, commercial development manager, Naugatuck chemical division, United States Rubber Co., Naugatuck, Conn.

One of the most important uses for acetylene in the chemical industry is in the manufacture of neoprene, a versatile synthetic rubber. Products made from this synthetic rubber, said Mr. Ayscue, will give many times the service life of products made from

J. I. BANASH, consulting engineer, and Herb Reinhard, secretary

J. J. CROWE (left), of Airco, and E. V. David, IAA's treasurer

J. W. DUNHAM, retiring president, and Al Chouinard, of NCG, Chicago

natural rubber under severe conditions of use.

Evening Session for Students

A meagerly attended evening session for the benefit of high school students was staged at the auditorium of the George Washington High School, a considerable distance away from the hotel. Session co-chairmen were: James W. Dunham, president of the International Acetylene Association, and H. L. Harshman, assistant superintendent of Indianapolis schools.

After a showing of the excellent IAA motion picture, "The Oxyacetylene Flame—Master of Metals," a talk on the opportunities for young men in the welding industry was delivered by Professor Robert S. Green, chairman of the department of welding engineering, Ohio State University, Columbus, O. Professor Green covered everything from jobs for welding operators to those for graduates with a welding engineering degree. This year, he said, only eight men in the entire United States will be graduating with such a degree and each of them has already received several offers of employment.

As evidence of the opportunities that exist in welding, Professor Green told his audience to look at Indianapolis, where there exist twelve firms whose sole business is the distribution of welding equipment and supplies.

A panel session followed Professor Green's inspirational talk. The four-man panel included two members from industry and two members from the educational field. Industry members were Wayne McGlade, manager of manufacturing engineering, J. D. Adams Mfg. Co., Indianapolis, and J. R. Wirt, process engineer, Delco-Remy Div., General Motors Corp., Anderson, Ind. The educational members were Howard W. Smith, supervisor of welding shops, board of education, Chicago, and Carl H. Turnquist, head of the welding department, Cass Technical High School, Detroit.

Mr. McGlade told how welding has influenced the design and production of earth-moving equipment made by his company. Mr. Wirt, in an excellent brief talk, pointed out the phenomenal growth of welding in the past ten years, as evidenced by the greatly increased number of welding jobs at Delco-Remy. Mr. Smith listed the opportunities for welding and flame-cutting operators in the Chicago area.

Mr. Turnquist had an excellent point to make on the lack of welding educational facilities in our schools. "The shops are relatively inexpensive to install," he said. "One complete welding shop can be established for the cost of one good milling machine."

After each panel member had read his prepared discussion, questions were invited from the audience. All in all, a great deal of trouble and thought was given to this session, and it is to be greatly regretted that more students did not take advantage of it.

The writer would like to interject a personal gripe at this time. Upon emerging from the high school at the close of the evening session, he found out that taxis were unobtainable and that the Indianapolis public transportation system had apparently stopped running. Twenty-two blocks proved a long walk back to the Claypool Hotel. He suggests that for the future evening sessions of this nature, transportation both going and coming be arranged for in advance. Tickets could be sold at the time of registration to pay for the costs and perhaps net a small profit.

Plant Inspection Trip

Buses were thoughtfully provided the next day (Tuesday) for the inspection trip to the Prest-O-Lite factory at Speedway, Ind., a western suburb of Indianapolis. This very well managed affair moved with clockwork precision. Great credit is due to the foresight of the men who planned it and to the diligence of those who carried out the plans.

In addition to IAA members and visiting directors of the American Welding Society, about 125 students from Purdue University and Rose Polytechnic Institute were also entertained. Altogether, luncheon for some 300 visitors was served in the plant cafeteria. And a very good lunch!

The morning tour was through the areas manufacturing acetylene cylinders and acetylene generators. Many applications of welding were found. When this part of the tour was over, the plant visitors were taken across the street to the Speedway Theatre to see animated cartoons produced by the Extension Department of Harding College, Searcy, Ark., to "create a better understanding of what makes America the finest place in the world in which to live." These cartoon films are excellent jobs, comparing favorably in technical excellence and entertainment value with the best products of Hollywood studios.

The movie show merged into another IAA session, at which Clarence McL. Pitts, president, The Peoples

(Continued on page 62)

ATTRACTIVE display boards and handsome counters work together to stimulate sales inside the Mars Duluth store

Distributor

No Manufacturing

THIS DISTRIBUTOR has a peculiar problem: it is located in a territory where production manufacturing plants contribute only a small part of the overall industrial activity. Most sales are made primarily to the maintenance shops of companies developing the natural resources of the Lake Superior district. A small portion of total sales are made to machine shops, garages and welding shops, but their activities also are primarily maintenance.

By T. B. JEFFERSON

FOR sixty years, "men of Mars" have been serving the maintenance needs of shops operated by iron and copper mines, railroads, coal docks, grain elevators, steel mills, paper mills, contractors and heavy industries. With headquarters at Duluth, the Martians serve a vast territory embracing northern Minnesota, northern Wisconsin and the upper peninsula of Michigan.

It was in 1892 that William P. Mars and Loren Prescott formed the company of Prescott and Mars at Virginia, Minn. Through this organization and subsequent companies, the "men of Mars" have fought their long war against wear and breakdowns by selling industrial supplies and related equipment. In 1924, Robert S. Mars and his father formed the present firm of W. P. and R. S. Mars Company.

$131,789 THE FIRST YEAR

Starting in a small warehouse having only 2,500 sq ft of floor space, father and son produced the astounding sales total of $131,789 in their first year. The activities of the company have grown until the Duluth warehouse now has 25,000 sq ft and employs 33 people. Two more Mars employees are engaged in the new 9,000 sq ft warehouse at Hibbing, Minn., which is in the iron country about 75 miles northwest of Duluth.

William P. Mars retired from the business in 1932, but the 85-year-old gentleman still calls at the office occasionally to see how his son and two grandsons are making out. R. S. Mars, better known as Bob, is the present active operating head of the company. Bob is aided by two smart sons: W. A. (Bill) and R. S. (Bob Jr.), both college trained men who entered the business when they were released from military service after World War II.

Bill, with an engineering education, proved a natural as vice-president and sales manager of the organization. Bob Jr., whose college training was in business management, was well suited to take over the offices of vice-president and secretary. "With more overhead coming into the firm," Bob Sr. explains it, "we had to expand our activities."

This expansion was good for the company. It now employs five outside general salesmen, two over-the-counter men and two welding experts

ON THE SALES FLOOR. Arc welders and hard-facings are this distributor's biggest sellers in welding lines

for Maintenance

who concern themselves only with the promotion of welding equipment and accessories. The general salesmen sell welding, but they are not practical weldors, and their contributions account for only a small part of the company's total welding sales. In 1951, the grand sales total was over $2,500,000, of which more than 25% could be attributed to the company's welding department.

The welding lines handled cover almost the entire range of the welding field. Though gas and resistance welding are not included, special emphasis is laid on arc welding and hard-facing. Mars does not handle welding gases; consequently, there has been little need to operate its own trucks. Commercial trucks and truck lines served very satisfactorily until the opening of the Hibbing warehouse when the picture changed somewhat. Mars now operates one truck to render "hot shot" service.

Hard-facing a Specialty

A large part of the welding sales are in the field of hard-facing. Besides hard-facing rods and electrodes, Mars also carries a comprehensive line of repointer bars and applicator bars with which to rebuild shovel teeth, grouser plates and crusher rolls or jaws.

Much of the business handled is with mining companies, copper and iron ore, and servicemen Dale Miller and John Scheringer are often called upon to recommend and do hard-facing jobs to prolong the life of equipment. Since both men have been weldors in mine and maintenance shops, they usually experience no difficulty in finding the proper material and procedure for the particular job involved. Both of these men have also had special factory training (to be described later) so that they are thoroughly familiar with the products.

Like other progressive welding distributors, Mars realizes the importance of carrying supplemental lines to work with welding materials. For this reason, they carry one of the best stocks of grinding wheels to be found anywhere in the region. Wherever a lot of welding is done, there is bound to be grinding. When hard-facing deposits are ground, the life of the wheel is materially shortened. Since Mars sells lots of hard-facing, it follows as a matter of course that lots of grinding wheels are needed.

With the other lines of equipment carried in stock, the present day inventory runs at nearly one-half million dollars. Besides welding equipment and supplies, the products handled include machine tools, machine shop supplies, woodworking machinery, woodworking shop supplies, sheet

OUTDOOR billboards remind customers where to buy their welding products

R. S. MARS (better known as Bob) is president and general manager

SALES STAFF enjoys dinner with the management. Frequent sales meetings are held to keep salesmen up-to-date and make their jobs more interesting

W. A. MARS (Bill) is vice-president and serves as sales manager

R. S. MARS, Jr. (another Bob) is vice-president and also secretary

metal machinery, logging and sawmill supplies, pipe tools, portable electric and pneumatic tools, industrial rubber products, lubricating devices, material handling equipment, wire rope, chain, manila rope, steel lockers and shelving, industrial safety materials and fire prevention equipment.

Arc Welders Rented

Recently, because of customer demand, the welding department found itself in a new business. Federal tax laws allow companies to deduct rent and operating expenses for their full amount, but capital equipment must be depreciated over a period of time. Because of this, contractors, mining companies and others are finding it advantageous to rent their welding equipment instead of buying it. Hence the Mars welding department has started to rent arc welders. From a small beginning, made three months ago, this service has grown to an increasingly important function of the business. There are now some 30 arc welders, both motor-generator and engine-driven sets, that are out on a rental basis.

No account of the W. P. & R. S. Mars Company would be complete without saying something about Bob Mars' business philosophy. The present head of the firm feels that it is not enough to be a good businessman; one must also be a good citizen. And a good citizen, Bob feels, is an active rather than a passive member of the community.

Bob Sr. is easily one of the most public-spirited men in Duluth. He has been a president of the Duluth Chamber of Commerce, has directed the Community Chest drive and has served extensively on other local organizations. During the war years, he was extremely active in civilian defense activities. To his own industry, Bob has contributed a year of notable service as president of the National Welding Supply Association for 1949-1950.

The active management of his own company is not enough to keep Bob occupied. He also serves as a director of a bank and of five other organizations. All of this takes up much time, but it also leads to valuable contacts. Bob feels, in fact, that much of the success of his company can be attributed to the friendships he has made while serving the useful needs of the community.

Bob and his sons are also firm believers in advertising. The company has long conducted an active campaign of publicity and advertising, for which more than $10,000 a year is appropriated and spent. Direct mailings to customers swallow up a good share of the appropriation. The company has its own multilith printing equipment and is able to get out mailings at short notice to an extensive list of customers.

Larger customers are furnished with a handsomely printed 364-page catalog. The catalog is kept up-to-date by mailing multilith revisions.

Billboards Used, Too

Outdoor billboards are an unusual form of advertising for a welding dis-

DALE E. MILLER (left) and John M. Scheringer, the welding sales technicians. Both have backgrounds as weldors in maintenance shops

GRINDING wheels are a big specialty item, and all sizes are carried in stock

tributor. Mars has three, devoted solely to the advertising of welding equipment (see illustration at beginning of article). Two of these billboards are near Duluth, while the other is on the iron range some 75 miles away.

Salesmen have to follow up the advertising program. Extreme care has been exercised in the selection and training of salesmen. The company tries, insofar as possible, to promote men who have been serving in such jobs as warehousemen, shipping clerks, etc. The management feels that good men should be rewarded by better jobs and, furthermore, that such employees are familiar with the conduct of the business, have been trained to company methods and policies and, above all, know (or should know) the products handled and their specific applications.

Exceptions to the rule of promotion within the ranks are the two salesmen of welding equipment. These men were outsiders having years of experience in welding. Here it was felt that specialized training in the welding field was more important than overall knowledge of the company's lines.

Particular care is exercised to be sure that the right man is selected for the territory or work to which he is to be assigned. Territories are not identical in volume, sales potential nor in the type of work to be done. The same is true of men. They are not identical and must be carefully selected on their ability to fill the appointment.

Working on this basis, the Mars company attempts to place each man where his background will be an asset to the customer, to the company and to himself. For example, in some territories selling ability is of predominate importance, in others the technical knowledge and know-how of the trained engineer are required. Carrying it a step farther, the management feels that some men are more at home with the country trade, others on maintenance and still another type might be best suited to sell manufacturing and production plants. Also, salesmen greatly vary in their likes and dislikes. Some of them do not seem to mind being away from their homes and families for indefinite periods, while others do not like to remain away over night. All of these factors enter into the selection of a salesman.

Factory Visits

As a part of their sales training, the Mars men visit the factory that makes the products they sell. Factory visits give them the opportunity of discussing sales problems, reviewing new products and obtaining the answers at the source of information.

To make such a trip most productive for the salesman and the company, Bob Sr. requests the salesman to prepare in advance an agenda covering points of interest and items to be reviewed and discussed. This agenda should be prepared in time to be presented prior to the salesmen's visit so that the manufacturer will know what questions to expect.

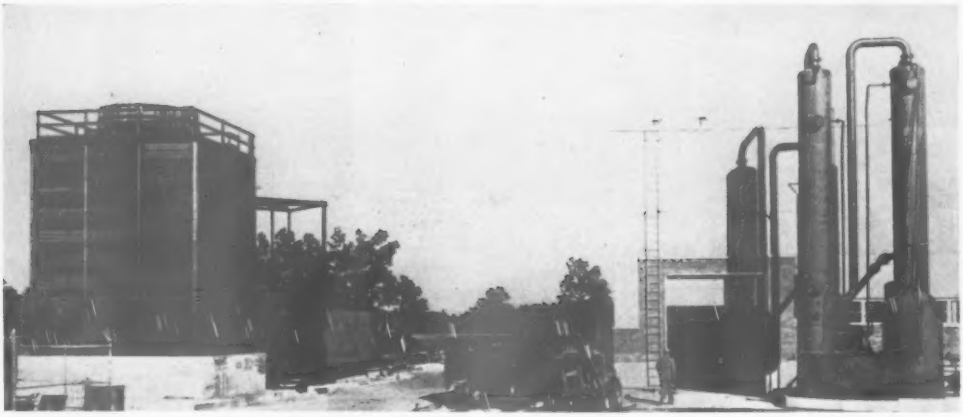
One more thing: the welding salesmen are equipped with cameras at company expense and are asked to photograph interesting applications of welding. These pictures may help other customers who are confronted with similar problems. Moreover, the pictures and stories about various installations are often published in the company's house organ.

Keeping Men Out of Ruts

Frequent sales meetings insure a good understanding between the sales staff and the management. These sales meetings are often led by sales executives from equipment suppliers so that the Mars salesmen may be apprised of the latest development of a particular product. The Mars men are thus given information which otherwise might be obtained only after stumbling through many sales presentations. Such constant and continual training keeps salesmen up-to-date and makes them feel that they are important to the organization. It is an excellent way to keep salesmen out of a rut by making their jobs more interesting.

"The distribution business," says Bob Sr., "is a joint responsibility of the manufacturer and the distributor. They must jointly view their mutual problems of creating demand and expanding the market for more goods that can be sold and produced at a profit."

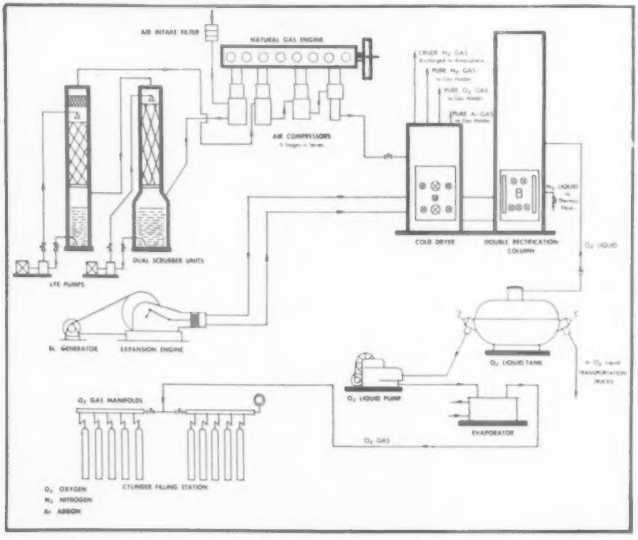
Bob believes this can best be done by jointly working out better methods of distribution by keen, alert, well posted, well informed salesmen. He has proved it in the Duluth area.



2–DUAL air-scrubber and lye-pump units are seen on the right. At far left is the water-cooling tower; behind it are three gas holders for the oxygen, nitrogen and argon gases produced at the new Houston plant

New Million-Dollar Plant

Anticipating a rapidly expanding industrial development in the Southwest, Houston Oxygen Co. put in operation on April 12 a new plant for the production of liquid oxygen, liquid nitrogen; and oxygen, nitrogen and argon gases. Simultaneously, meters started ticking on the first oxygen pipeline to supply multiple customers.



1–FLOW CHART (simplified) shows essential steps in oxygen production

BY J. F. BRINLEY

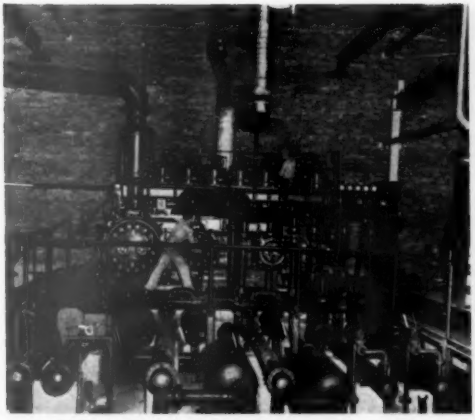
THE new million-dollar plant at Houston, Texas, is stated to be the first oxygen plant of its type in the nation to be operated by an independent company. It is owned by the Houston Oxygen Co., an affiliate of the Big Three Welding Equipment Co., also of Houston.

It is said that probably fewer than one thousand persons have ever been privileged to go through the few large-production oxygen plants of the nation. Certainly, very few photographs of such plants have been permitted and fewer still published. That is why a pictorial tour of the new plant should be of exceptional interest to readers of this publication.

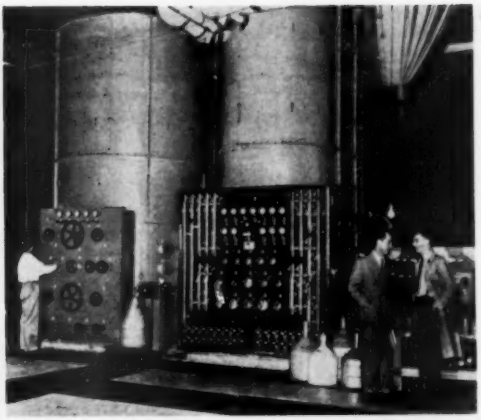
"The whole thing is really very simple," plant engineers will tell you. "All you have to do is to compress air—then expand, condense, distill and evaporate."

Anyone fortunate enough to tour the plant soon learns the above is a masterful understatement of fact. There is ample evidence of many another complicated process employed here—not to mention the engineering secrets quite obviously concealed within the steel columns and other apparatus.

The oxygen industry utilizes the world's only free raw product—air.



3–NATURAL GAS engine and five-stage battery of air compressors. Heat exchangers are in foreground



4–COLD DRYER control panel is at the left. Rectification column is behind the large instrument panel

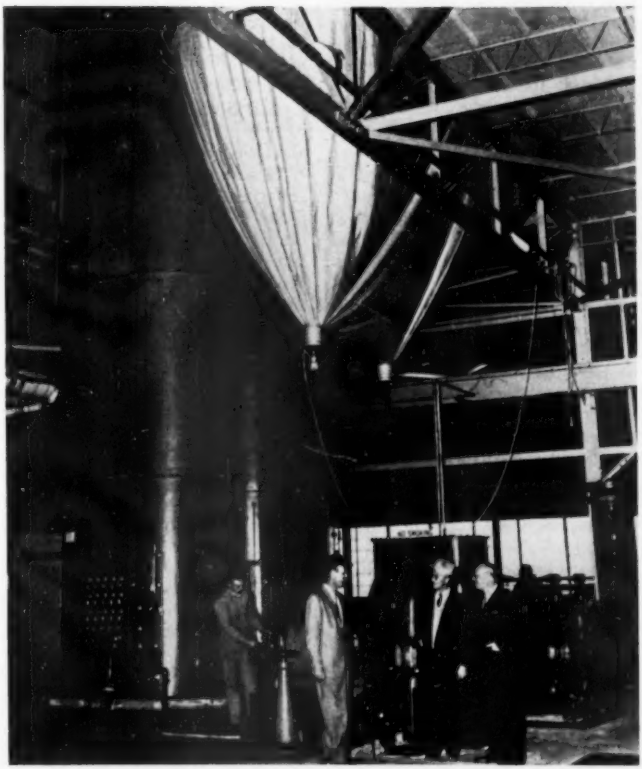
for Oxygen and Nitrogen

Some of the products made from atmospheric air are quite astounding. One example is liquid oxygen, which bubbles and looks like boiling water. It is odorless, crystal-clear and slightly blueish in color; it pours like water but is strongly magnetic and in this respect somewhat resembles mercury. The temperature of liquid oxygen, as drawn from final processing, is —183 C (a mere 329 F below the freezing point of water), and it rapidly and constantly evaporates, giving off a steamlike vapor. Liquid oxygen cannot be stored nor carried in a sealed vessel because the creation of vapor is continuous and would quickly build up a pressure and cause a violent and dangerous explosion if the gas were confined. Liquid oxygen is stored in heavily insulated tanks that resist temperature loss and minimize evaporation.

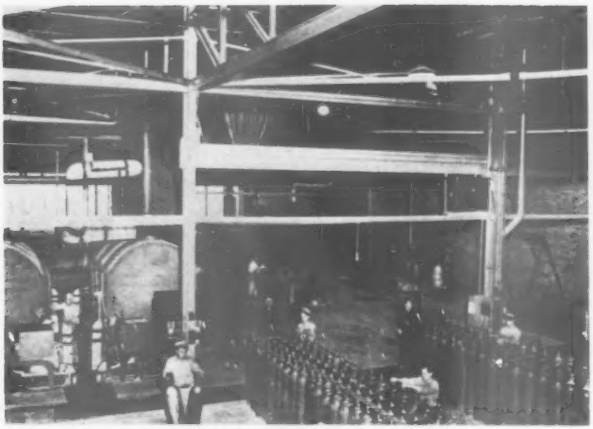
Liquid nitrogen is as colorless as water but otherwise looks and acts very much like liquid oxygen. Its temperature, as drawn from final processing, is —196 C—thirteen degrees Centigrade lower than liquid oxygen.

Interesting Demonstrations

The top half of a weed and root freshly pulled from the earth was submerged in liquid nitrogen for five



5–RECTIFICATION column, expansion engine and balloon for crude argon gas



6–LIQUID oxygen storage tanks and pumps at left; at right the evaporators that convert liquid oxygen to dry gas for the cylinders

7–MAIN meter on newly completed oxygen pipeline to serve Houston customers

seconds. When removed, the green weed (unchanged in color or other appearance) was lightly tapped upon a laboratory table, whereupon the top half of the weed shattered into small particles like splintered glass. The lower half of the weed and root (which had not been submerged) shriveled up and died 30 seconds later. An effective—but too costly—weed killer!

Cure for Headaches

A small half-jigger of liquid nitrogen was poured into a felt hat, rolled around the crown and leather sweatband for ten seconds and then dumped out. The hat was immediately placed on the head. The shock was startling—as if the head were held in a vise of terrific cold. However, a severe headache of several hours' duration was instantly dissipated! The air-conditioned hat retained its pleasant cooling effect to the head for about 15 minutes, and the headache did not return. This is a treatment often used by plant employees to get rid of headaches.

When a thimbleful of either of these low-temperature liquids is poured over the back of the hand and allowed to fall off, the effect is quite harmless. But if the same quantity of either liquid nitrogen or liquid oxygen were permitted to remain in the palm of the hand for even five seconds, a serious and painful burn would result.

Another interesting demonstration was to pour a cupful of liquid oxygen from a height of three feet to the concrete floor. The liquid disappeared as it struck the concrete, being instantly and completely evaporated faster than the eye could detect. Nevertheless, the sound of some of the liquid striking the floor could be heard!

Such are the seeming miracles performed with liquids at these extremely cold temperatures. There are also more practical uses.

To see how oxygen, nitrogen and argon are extracted from the atmosphere, consult the simplified flow chart, Fig. 1. First, air is filtered and taken from the atmosphere by the first stage of the 5-stage battery of air compressors (Fig. 3). The air is compressed to 30 psi in the first stage and is sent through dual scrubber towers (Fig. 2). These are located outside of the building and operated with dual lye pumps. From the scrubbers, the air is delivered to the second compressor stage, where it is further compressed to 115 psi.

Other Compressor Stages

The air goes from the second to the third compressor stage, where it is compressed to 400 psi; to the fourth stage where it is compressed to 840 psi, and finally to the fifth stage, which turns the air out at 2,350 psi. Upon leaving each compressor stage, the air is cooled by passing it through a heat exchanger before it goes to the next stage. The heat exchangers for the five compressor stages are shown in the foreground of Fig. 3; the natural gas engine and battery of compressors in the background.

The air under 2,350 psi pressure goes to a cold dryer unit (Fig. 4), next to the base of the rectification column. Here the moisture in the air is frozen off under a temperature of —35 C. The cold dryer also serves other purposes in the latter stages of processing, as will be explained later. The cooled air leaves the cold dryer divided into two separate parts, which can be identified as part A (comprising about 1/3 of the volume) and part B (comprising the balance).

Expansion Lowers Temperature

Part A of the air goes from the cold dryer through a heat exchanger and is cooled to —150 C; thence it passes to a liquefying exchanger where it is cooled to —175 C. This part of the air (still under 2,350 psi pressure) then passes through an expansion valve, where it is expanded to lower the pressure to 75 psi just before entering the rectification column. This terrific expansion converts a high percentage of the part A air to a liquid. Both the liquid air and the remainder of the gaseous air flow into the rectification column.

Part B air, comprising about 2/3 of the original air volume, also leaves the cold dryer at —35 C. Still under 2,350 psi, it goes to a high-pressure expansion engine. This does the same job as the expansion valve does for

part A air; that is to lower the pressure to 75 psi. The expansion lowers the temperature to —165 C. This cooled air now passes through dual filters to remove any trace of oil picked up from the expansion engine since oil traces would be highly dangerous in later processing.

The part B air is delivered to the same liquefying exchanger through which the part A air travels but is kept entirely separate from the part A air so that they in no way mingle. The part B air from the expansion engine is further cooled to —175 C in the liquefying exchanger, and then it also enters the rectification column —still separately from part A. So now we have all of the compressed air, parts A and B—some as liquid air and some as gaseous air—in the rectification column.

We learn from the engineers that the expansion engine is one of the key points for making liquid oxygen in volume production with the high efficiency attained. This engine is powered by the force of the high-pressure air as it expands in the engine. As a by-product, its flywheel utilizes a belt to drive a 44-kw generator, which supplies part of the power and lighting requirements.

The expansion engine and generator appear in Fig. 5. The gentleman in the light suit in this picture is Alfred K. Smith, president of the new million-dollar liquid oxygen plant; on the right of Mr. Smith are Al Herzstein, general manager (extreme right) and O. L. Rogers, sales manager. Behind these three officials are the expansion engine and generator.

Rectification Column

The rectification column (extreme left of Fig. 5) functions primarily as a double column. The lower portion is termed the first rectification column, the upper portion the second rectification column. The column contains a gel-absorber to trap and remove any trace of acetylene gas with which the original air from the atmosphere might be contaminated. This renders the column safe against explosion. The rectification column also contains three other separate rectification systems and many additional units employed in the various refining processes.

Both parts of the air, A and B enter the first or lower rectification column, where rectification starts. By a series of distillations, the liquid air is separated into crude liquid oxygen and crude liquid nitrogen. Each of these crude liquids is then expanded from 75 psi to 6 psi, and both enter the second (upper) rectification column, where pure rectification takes place. The results are: (1) a 99.7% pure liquid oxygen (at a temperature of —183 C), (2) a highly refined oxygen gas and (3) a "nearly pure" nitrogen gas in the second rectification column.

The nitrogen gas is taken off and transferred to another rectification column within the main column structure. Here nitrogen gas 99.9% pure and liquid nitrogen 99.95% pure are produced. The nitrogen gas is returned to the cold dryer unit before passing it to a gas holder, and the pure liquid nitrogen is drawn off (at a temperature of —196 C) and stored in thermos flasks for delivery to laboratories for testing purposes, research, etc.

Argon Gas Production

A portion of the highly refined oxygen gas is drawn off the second rectification column and is transferred to another rectification column within the main column structure. Here it is liquefied by a condenser and separated into oxygen gas and crude argon gas. The crude argon is stored in the large balloon suspended under the roof of the building (shown at upper center of Fig. 5). From the balloon, the crude argon gas is returned to still another rectification system within the main column structure, where it is highly purified (to 99.9% purity) before being returned through the cold dryer unit and passing on to a pure argon gas holder. The crude argon gas residue is returned to the cold dryer and then discharged into the atmosphere as waste.

Liquid Oxygen and Oxygen Gas

The dry oxygen gas left from processing at the second rectification column is drawn off and returned to the cold dryer unit, where it is more highly refined (to 99.7% purity) before passing on to a gas holder.

From the second rectification column, the liquid oxygen is also drawn off and transferred to two well insulated storage tanks (left of Fig. 6). Each tank holds the liquid equivalent of 1,000,000 cu ft of gas.

The liquid oxygen in the two storage tanks is the main source from which volume production of oxygen gas is produced. From the tanks, the liquid is pumped under 2,200 psi to two evaporator heaters (extreme right of Fig. 6), which convert the liquid oxygen to large volumes of dry oxygen gas. Part of this is conveyed to gas manifolds at the cylinder filling stations, where the familiar steel oxygen cylinders are charged with gas under 2,200 psi pressure.

Oxygen Pipeline

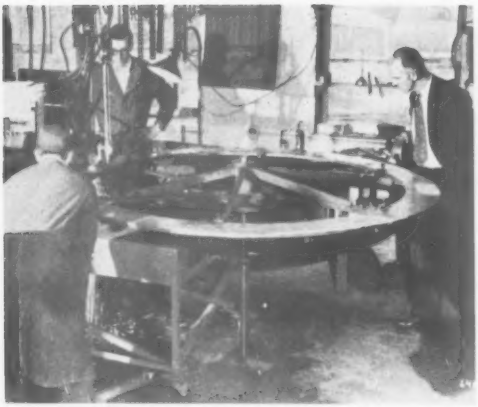
Part of the dry oxygen gas produced feeds the company's new industrial oxygen pipeline, which has just been placed in service. In Fig. 7, Sales Manager Rogers (left) and Harper Avis, plant superintendent, are examining the main meter, from which the 3-in. pipe goes underground. The line runs southeast from the oxygen plant, in the western section of Houston, to supply many large plants. The pipeline is laid almost to the intersection of Hempstead and Katy roads, and rights-of-way have been granted to extend it another four miles due west to supply other industrial oxygen users in that area. If needed, additional pipelines can probably be run in other directions to supply other industrial areas in Houston.

The pipeline was tested under 200 psi pressure, but it is operated under 100 psi only, so there is a high margin of safety, according to General Manager Al Herzstein. Each customer has a meter for measuring his consumption, so it is really like a fuel-gas line in operation.

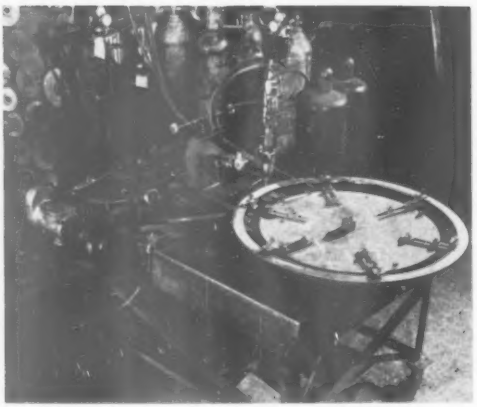
A. K. Smith, genial president of Houston Oxygen Co., makes this comment on oxygen pipelining:

"The economical advantages of installing central-system oxygen and acetylene lines within industrial plants using welding and cutting operations are yet to be utilized in full measure. The usual individual cylinders need no longer be handled; regulators and hoses no longer switched from empty to full cylinders; lost production due to such delays no longer suffered. These savings in labor costs alone will represent a sizable contribution to any cus-

(Continued on Page 92)



1—STARTING work on an 84-in. gear—42 teeth were cut in 40 minutes. Note jury spindle to rotate gear



2—SCRIBING a tooth form to compare with specification before cutting. Ring gear will have 124 teeth

Precision Flame-Machining

Special flame-cutting machines developed for toothed wheels enable large gears having many teeth to be cut in surprisingly short time. Set-up changes are easy.

BY GLENWAY MAXON
President, Cogmatic Co., Milwaukee

OUR PRINCIPAL business is the flame-cutting of gears, sprockets and other toothed wheels. We cut gears and sprockets used in the manufacture of machines for construction equipment, farming, mining, etc. Our daily production is around 40 units per day per machine, and we are able to handle gears ranging in outside diameter from 2½ to 105 in.

No Machining after Cutting

By applying the principles of precision machining to flame-cutting, we are able to cut gears so accurately that no machining at all has to be done on the teeth. The result, as may be imagined, is a considerable saving in time and labor costs. Mechanized flame-cutting equipment is, of course, the secret.

Figure 1 shows a typical job, a large gear that we cut for the Heil Co., Milwaukee. This gear has an OD of 84 in. and was cut from 1-in. mild-steel plate. We were able to cut all 42 teeth in 40 minutes.

We consume about 600 cu ft of oxygen in a working day and about 90 cu ft of acetylene per machine when running close to maximum output. The oxygen is supplied from manifolds of five cylinders, including high-pressure oxygen, through an individual hose distribution system. We purchase acetylene in tanks.

The precision that we are able to attain in gear cutting is made possible by a special type of machine that we developed for this purpose. Originally, we designed this machine to cut ring gears for concrete mixers and other revolving drum machines, but it has gradually found usefulness in the production of many other types of gears and sprockets.

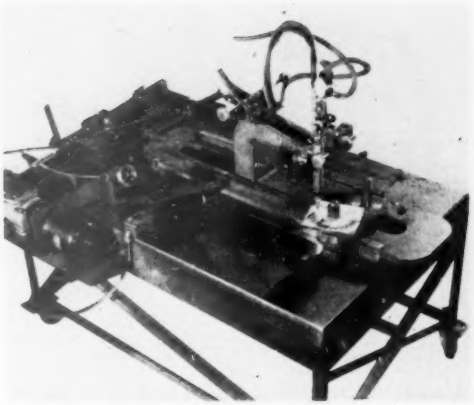
Sometimes we use rings for gear blanks; sometimes round discs. Square blanks can also be used; in fact, in some cases, irregular pieces of scrap are machined into useful gears or sprockets. The blanks are set on one of several spindles on the machine, the spindle selected depending on the size of the blank being cut. Two motions are involved: rotation of the blank and oscillation of the torch. These two motions are combined vectorially to result in the desired tooth contour.

Cam Directs Contours

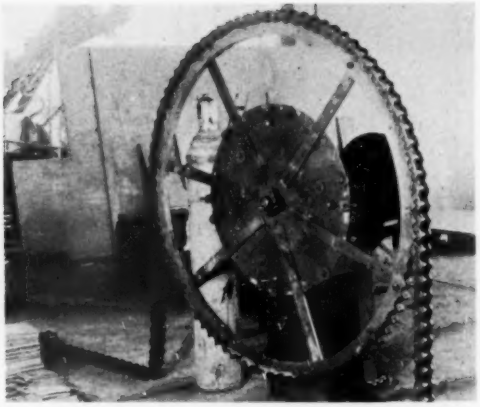
Tooth contours are dictated by the cam causing the oscillating movement. This cam revolves once for each tooth cut, while the blank revolves once for the completed gear. A single cam can take care of a number of different-sized teeth; in fact, we only need four cams to cut all sizes of roller chain sprockets. Size of teeth is determined by modification of the cam motion through an adjustable reducing leverage. The shape of the tooth can also be influenced by a change in the pitch radius of the toothed wheel to be cut. Change gears provide the ratio between cam and blank to give the required number of teeth.

The cam moves a torch carriage through pantagraph levers. Micrometer adjustments permit minor changes in the diameter to provide a great degree of accuracy. For major adjustment, the torch carriage slides in machined ways on a roller carriage, to which it is clamped. Micrometer adjustments set the final location.

The torches may be tilted for angular adjustment, particularly to square the cut with the face of the blank.



3—BLANKS for small gears like this roller chain sprocket are set on an auxiliary spindle and centered



4—IT TOOK only 32 minutes to flame-cut this big sprocket—over 5 ft in diameter and having 86 teeth

# of Gears and Sprockets

To summarize, the various adjustments consist of: the diameter, effected by means of sliding the torch carriage on the roller carriage and micrometer adjustment from there on; angle adjustment; adjustment for amplitude; change gears to select the required number of teeth.

In addition to all the above, there is an adjustment to make uniform the instantaneous speed between flame and metal. This is accomplished by use of a second cam, integrally mounted with the shape-forming cam. The second cam controls a variable-speed drive to give the required speed.

Set-up Times

To reset the machine to cut a 45-tooth sprocket after having cut an 80-tooth sprocket requires only a change of gears and pitch diameter. This two-item setting is made in from 5 to 10 minutes. A change in pitch from a ¾-in. to a 1-in. roller chain sprocket requires one additional setting—the pantagraph. The time to change from one pitch to another (using the same cam), to change the number of teeth and to change the pitch diameter would be from 7 to 12 minutes.

A complete change of all parts—tooth form, number of teeth, size, pitch diameter, speed and size of torch tip—takes about 25 minutes. The ability to set up the machine to do such a variety of work makes it a valuable tool for emergency jobs of gear cutting.

Very large sprockets or gears require the addition of an outboard rotating spindle to mount the blank. Set-up time for these extremely large pieces may amount to 1½ hours.

Scribing before Cutting

One convenient feature is the ability to scribe the tooth before cutting. A pencil or scribe is attached to the torch in place of a tip in order to trace the outline on the steel gear blank. This outline can then be compared to the desired tooth form, making a close check possible before cutting.

In Fig. 2, a tooth form is about to be scribed on a gear blank rolled from a 2 by ¾ in. bar, in preparation to cutting a 124-tooth ring gear for a concrete mixer. Cutting time for the entire gear was 20 minutes.

As work progresses, the blank may be cooled with a small stream of water to prevent distortion. This makes it possible to flame-cut very light gear and sprocket rings. The fixtures for holding these parts can also be of light weight, and little clamping force is necessary.

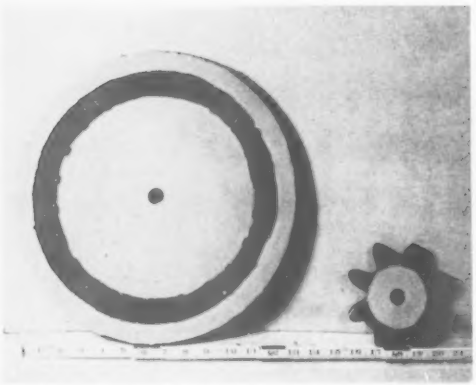
Each machine is equipped with two spindles and two torches. The spindle nearest to the operator is generally used for small parts, that is from 2½ to 10 in. in diameter. In the case of small sprockets or gears, the blank is set on the revolving spindle plate, and centered by means of a button. Figure 3 shows a small roller-chain sprocket being cut in this manner.

The larger spindle rotates work from 6 in. up. To carry the largest work, a jury spindle can be used to provide a rotating center remote from the torch (see Fig. 1). There appears to be no practical limit to the size of pieces that can be cut when the jury spindle method is employed. The first machine, designed to cut blanks up to 54 in. in diameter, can now handle gears up to 96 in. in diameter by the use of a jury spindle.

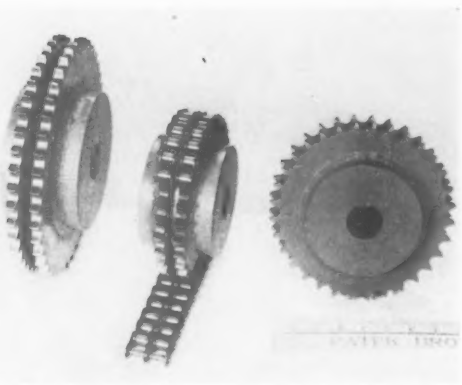
An example of larger work appears in Fig. 4. This 63-in. roller chain sprocket has 86 teeth of 2¼-in. pitch. Actual flame-cutting took 32 minutes and piece-changing time an additional 5 to 8 minutes.

Multiple Production

Sometimes it is desired to cut two pieces at once. We have designed a three-spindle attachment, but production runs have not been sufficiently long to explore the saving in time. To secure the proper torch heights and



5—ACCURATE cutting allows external and internal gears to be cut at the same time without extra cost



6—DOUBLE-STRAND sprockets having 42, 28 and 32 teeth. The hubs were cut from 1-in. plate and welded

flame control for multiple production requires greater skill in operation. On the other hand, one man can handle more than one machine.

Cutting Speeds

The high-speed tips used are capable of cutting 26 in. per minute in ¼-in. thickness, 20 ipm in ¾-in. thickness or 16 ipm in 1½-in. thickness. These are the accepted speeds for straight-line cuts. Speeds are reduced 25 to 30% when pointed teeth, like those of roller chain sprockets, or teeth with flanks which approach the radial are cut. The actual speed of cutting then ranges from 20 ipm in ¼-in. material to 11 ipm in 1½-in. steel.

It is customary to translate this into inches of pitch line per minute. Naturally, the length of path for a tooth is greater than the pitch-line length between teeth. It is about 80% greater for gear teeth, about 50% greater for a cast tooth form and is, generally, 66 2/3% greater than the pitch-line length for roller chain sprockets. Actual pitch-line speed then for roller chain sprockets becomes 12 ipm for cutting ¼-in. and 6½ ipm for cutting 1½-in. plate.

A rule-of-thumb figure to cover all conditions is to allow 2 in. of pitch diameter per minute for a plate thickness of 1 in. or 120 in. of pitch diameter per hour. Cutting can be done faster with thinner plate, of course, but the blanks go on and off more often and there are more starts and stops. Hence the same 120 in. of pitch diameter per hour is probably a fair approximation for all plate thicknesses up to 1 in.

Accuracy

No concerted study has been done up to this time to determine the degree of accuracy that may be expected in commercial operation. We are now maintaining an average tolerance of ± 1/64 in. on parts from 12 to 48 in. in diameter, with tooth spacing even more accurate. The tolerance is slightly less than average for smaller pieces and greater for larger parts. The mechanism of the machine itself can be refined to commercial limits of ± 0.001 in. However, no exploration has been undertaken to improve torch accuracy, straightness of flame or uniformity of oxygen and acetylene flow. There should be opportunities in these directions for improved accuracy as practical experience builds up.

There is no added cost for cutting internal gears. In fact, the shroud from an external gear is itself a gear. On the left of Fig. 5 are internal and external gears cut from the same blank. The 8-tooth pinion that drives the internal gear is on the right. These gears are for an inexpensive material hoist. Manufacturers of double- reduction devices that use matching internal and external gears might find it a considerable advantage to be able to cut both in a single operation.

Multiple-strand sprockets have been flame-cut for the past three years. Figure 6 shows, left to right, 4-tooth, 28-tooth and 32-tooth double-strand sprockets that were cut for the A. O. Smith Corp., Milwaukee. The hubs were flame-cut from 1-in. plate and welded to the outer rings after the teeth had been cut.

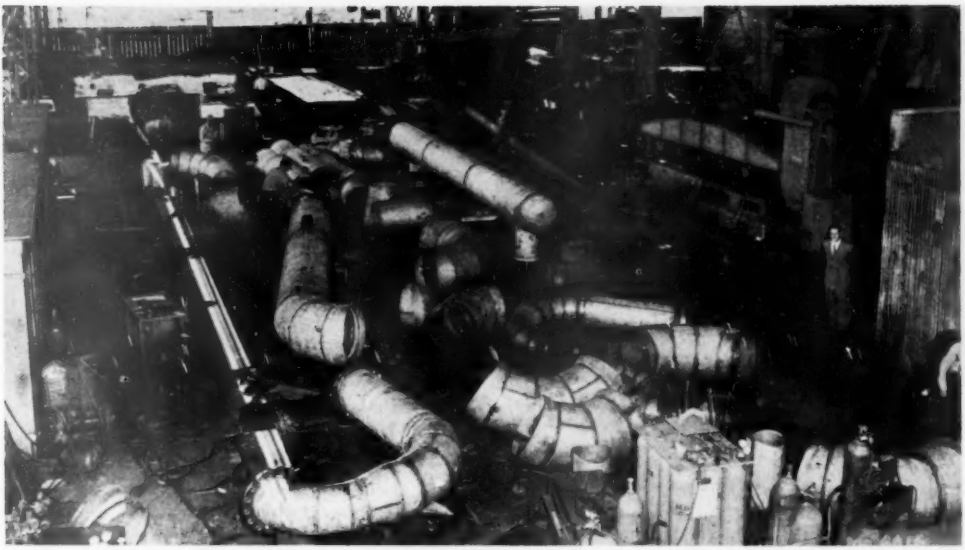
Looking to the Future

Inasmuch as pitch tolerances between teeth are of the order of 0.003 to 0.005 in. accuracy with respect to the first tooth and last tooth cut, this degree of precision might make it practicable to flame-cut very thick gears in several layers to be joined together after cutting. Dowel holes for fit-up purposes could be provided before cutting. Such laminated gears could be finished by cold cutting or, in cases where a great amount of alloy present might result in flame-hardening, by grinding.

Extremely large gears are even today being constructed in segments and connected into a ring by welding. Step gears might be made from laminations with the teeth offset thus approaching the smoothness in operation of a helical gear but avoiding the thrust and costing much less.

Reproductions of cam surfaces are possible. Successful cutting of austenitic manganese steel gears and sprockets for conditions subject to severe impact has been demonstrated. Fields yet to be entered, however, are provided by many other alloys that are difficult to machine by cold cutting methods.

These glimpses of the future are provocative, but we think are well worth reaching for. The greatest pleasure of machine designing lies in anticipation.



1—SUBASSEMBLIES and assemblies were of many odd shapes; pipe diameters varied, involving much . . .

Tricky Welding for Pipe System

The material was 304 ELC stainless, requiring inert-arc welding and flux-injection cutting. Everything had to be kept to a tolerance of 1/8 inch.

BY FRED M. BURT

A DIFFICULT job at the plant of Standard Steel Corp., Los Angeles, imposed major problems in design, layout and fabrication, requiring the use of some new methods.

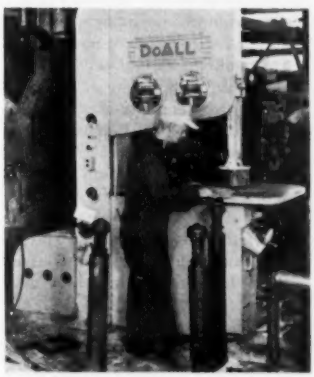
The job was to fabricate stainless-steel process water piping. As shown in Fig. 1, the subassemblies and assemblies were of many odd shapes. Pipe diameters were in four sizes: 16, 20, 24 and 36 in., requiring intermediate reducing sections. Elbows varied from 22 to 90 degrees, including such non-standard angles as 42°, 44° 37′, 17° 12′ and others. Everything had to be kept within a tolerance of ±1/8 in. When the whole unit was field assembled, it had to match up between inlets and outlets to this close tolerance, allowing about as much bending as can be applied to crisp pie crust without breaking it.

The basic material was 1/4-in. stainless steel of type 304 ELC (extra-low-carbon 18-8 stainless). The plates were cut to size on either a 12-ft high-speed square shear or on the friction saw illustrated in Fig. 2. All of the cutting that could not be done in a straight line on the shear was done on the friction saw, which, because of the contours of many of the cuts, was one of the most important units of equipment employed. The saw is equipped with a "job selector," providing speeds of from 70 to 15,000 feet per minute for metal sawing.

The various cut-to-size components were rolled to the proper radius on one of four heavy-duty bending rolls and were then welded together by automatic and manual inert-arc welding. These were the basic operations.

Iron-Free Surfaces Required

Rigid specifications required that all inside pipe surfaces should be iron-free on delivery. Before forming was started, the side of the sheet to become the inside was thoroughly cleaned and dried, then given a surface test to indicate the presence of iron. The test was made by applying a mixture of two solutions to the surface with a rubberset paint brush. The solutions are:



2—FRICTION saw was used to cut curved lines or irregular contours

Solution A	
Acetoacetanilide	48 grams
Acetone	744 cc
Solution B	
Ammonium acetate	24 grams
Distilled water	200 cc

3—AUTOMATIC inert-arc fixture to make outside longitudinal seams. A 30-inch pipe is being welded

4—MANUAL inert-arc welds were made on all circumferential seams, including this reducing section

Instructions (taken from the specifications) were:

Weigh the required amount of acetoacetanilide (a white solid) and ammonium acetate (crystalline) in separate containers. Measure the amount of acetone required for solution A, pour it over the acetoacetanilide and stir until the latter is dissolved. Measure the 200 cubic centimeters of iron-free water (distilled) required for solution B, pour it over the ammonium acetate and stir until the crystals dissolve.

These two solutions are mixed together as needed by measuring four volumes of A to one of B. The mixture should be used within 48 hours as it ends to turn brown, obscuring the red color that shows up in the test. If there is iron on the surface tested, the solution will turn from pink to blood-red within three minutes.

To maintain the iron-free condition of the surfaces, they were sprayed with a vinylite plastic resin in a heavy-liquid form, using a spray gun with a large orifice. One gallon of this material (used in "moth-balling" Naval vessels) will cover about 80 sq ft of surface. The plastic coating was unaffected by shearing, sawing or rolling, but it had to be peeled off for welding as the heat of the arc would tend to vulcanize the rubbery material. About 3 in. of coating were removed on each side of the seam to be welded.

Automatic and Manual Welding

Figure 3 shows the automatic inert-arc welding machine on which all outside longitudinal seams were welded. With the exception of the welding head and traveling carriage, the entire unit was designed and built by Standard Steel. In the upper center of the pipe (weldment) may be seen a 6-in. diameter cylinder containing circulating water; on top of this cylinder is a copper back-up strip. The fulcrum to move a series of parallel steel plates is under the operator's right thumb. These plates are arranged on both sides of the seam to be welded. The sharp inner ends of these two facing rows of plates dip down to clamp the pipe edges together. The clamping movement is actuated by inflating lengths of 3-in. high-pressure fire hose with compressed air at a pressure of around 35 psi. Pipe with diameters ranging from 8 to 42 in. can be welded on this machine; the pipe shown in the picture is 30 in. in diameter and 10 ft long.

After the outside longitudinal seams were welded automatically, they were chipped out on the inside for slag removal and to assure proper penetration of the inside weld. The latter welds were made manually with an inert-arc welding torch and filler wire. The same equipment was used to weld all circumferential seams, both inside and out. The weldor in Fig. 4 is doing the outside seam on an intermediate reducing section between 20-in. and 16-in. pipe.

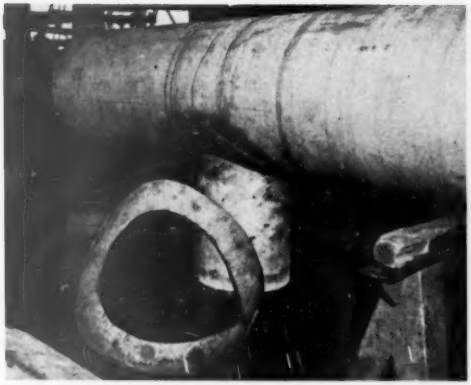
Each type of elbow was set in a special jig to hold it within the very close dimensional tolerances specified while it was being welded. To maintain accessibility for inside welds with elbow-sections, the weld sequence had to be carefully worked out.

Flux Flame-Cutting

Figure 5 provides a good example of the type of pipe fitting involved. The large horizontal pipe is 36 in. in diamteter; below it is a 24-in. outlet flanged for field connection. Leaning against the outlet is a reinforcing ring, which was laid out in the flat, cut and rolled. As a final operation, "weep holes" in the ring were drilled and tapped.

To allow for such connections as the 24-in. outlet in Fig. 5, holes of the proper size had to be flame-cut. The flame-cutting of stainless steel is very difficult unless a special process is used. There are two principal processes: flux-injection and powder cutting. Both processes direct an extraneous material into the cutting-oxygen stream: in one case a non-metallic powdered flux and in the other an iron-rich powder. For this particular application, flux-injection equipment was used. The purpose of the flux is to react with the refractory oxides of the non-ferrous materials included in stainless steel. Ordinarily, these refractory oxides protect the steel from the cutting oxygen. The non-metallic flux unites chemically with the refractory oxides, forming compounds of lower melting temperature that may be readily washed out of the cut to expose the steel.

All locations of supports, "Dresser" couplings, expansion joints and cen-



5—FLUX-INJECTION cutting had to be done to get holes for connections like this 24-in. flanged outlet

6—PLASTIC coating, sprayed on to keep inside surfaces free from iron, is stripped off after testing

terlines to guide field assemblies were marked on each pipe section. Every section or piece of stainless steel carried a steel-mill heat number, and each weld received the stamp of the certified weldor who did the job. The ASME Boiler Construction Code, Section VIII, Par. U-69, was followed as to design, fabrication and workmanship.

It was necessary to remove from the inside welds all crevices or pits that might trap substances flowing through the pipe. Fortunately inert-arc welding (when done by expert weldors) leaves very few crevices, projections or undercuts. Hence very little grinding was required, and in only a few spots was it found necessary to go back and reweld. It was, however, necessary to examine each inside seam, requiring the abilities of a contortionist from Chief Inspector Fred Bauman, who had to crawl into each pipe section. Bauman not only made a close inspection of every inch of welding but also applied the iron-detecting test previously described to the surfaces around the seams not covered by the plastic coating. All of the coating was peeled off, as shown in Fig. 6, just before preparation for shipment.

Hydrostatic Test Method

Each section of pipe was given a hydrostatic test at 150 psi. Those sections that had flanges on their ends were easily closed for testing by bolting on watertight test covers. Incidentally, the gasket faces of flanges were given a special treatment that included: (1) boring for recess, (2) facing with a deposit of 25-20 stainless electrode and (3) remachining to remove any pits or other irregularities.

If without Flanges—

Odd-shaped units of piping without flanges presented a real test problem. It was necessary to attach test flanges to receive test covers. As an example, let us consider a section of 30-in. pipe with a beveled edge (37 deg) for field welding. About 1½ in. back from the edge, eight evenly spaced lugs 2 by ½ in. were welded around the circumference. The ½-in. section of the lugs projected upwards, that is away from the pipe. A special flange of 30-in. ID was then slipped over the pipe end, the lugs passing through T-shaped slots cut out to fit them at the eight locations. After the transverse sections of the slots had engaged the lugs, a short turn in either direction locked the ring behind and against the lugs. A watertight cover was then bolted to the test flange ring. Machined into the test cover was a ring recess, which was packed with oakum to form a gasket to receive the 37-deg beveled edge.

Test covers for both flanged and unflanged ends had to be made up for all diameters of pipe.

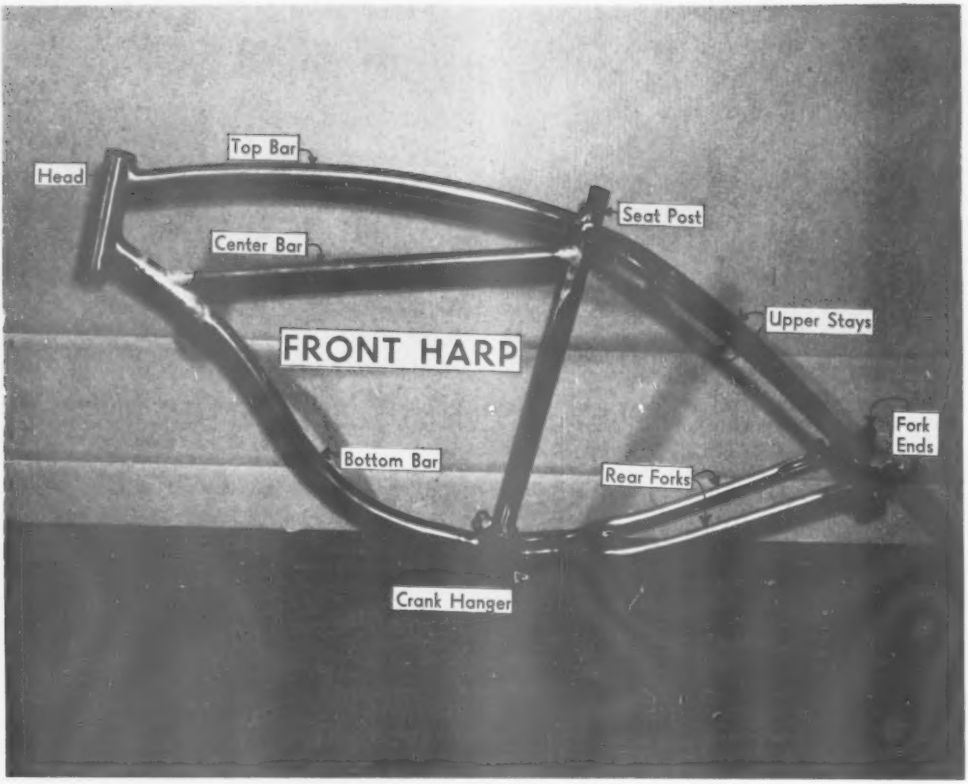
To keep the inner surfaces iron-free during shipment, the ends of each section were sealed with wooden covers having gaskets and tar paper liners.

The above job of pipe fabrication, done under the supervision of John Vincent, general superintendent, was just one incident to the Standard Steel Corp., one of the oldest and most widely experienced steel fabricators on the Pacific coast. The company's equipment includes a large submerged-arc welding fixture (see this month's front cover) that will accommodate vessels up to 25 ft long and 16 ft in diameter. A big flame-cutting machine has the capacity to trim and bevel plates of the greatest length and width available. There are four rolls for plate bending, one of which will roll plate up to 10 ft long and 1 in. thick and roll narrow tires out of plate 3 in. thick.

Steel plates up to 2 in. thick and 20 ft long are shaped on a 700-ton hydraulic press brake. This press has a rise of 5 ft and a width of 25 ft; it is operated by a three-cylinder hydraulic pump powered by a 75-hp motor. It is used to dish and form tank heads and (with a wide variety of dies available) for many other heavy forming jobs.

All of the equipment mentioned, as well as two 5-ton overhead cranes and many arc welders, is kept in full production operation. Besides doing a big business on all sorts of general and custom fabrication, Standard Steel Corp. has three main lines of its own products. These are: (1) dryers, coolers and kilns of all types and sizes; (2) fish-processing equipment (probably the most complete line manufactured); (3) asphalt paving plants.

It all adds up to a tremendous amount of welding.



1—JOINTS flash welded are: seat post to crank hanger; bottom bar to crank hanger; top and bottom bars to head. Top bar is braze welded to the seat post. Center bar is silver brazed to seat post and to the bottom bar

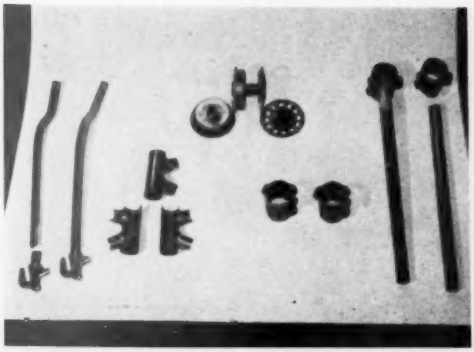
Welding Methods

MANY EXAMPLES of early types of bicycles will be found in a unique museum within the big Schwinn plant at 1718 N. Kildare Ave., Chicago. The very first was probably the "Hobby Horse," invented by Baron Drais, of Mannheim, Germany, in about 1816. This crude affair was little more than two wheels attached to a saddle. The rider propelled himself by thrusting his feet against the ground.

The second bicycle type, the "Velocipede," was born about 1862. Two Frenchmen and a German claimed the basic invention: the fitting of cranks and foot pedals to the axle of the front wheel. The trouble with this device was that the rider had to pedal too fast to work up any speed. That particular difficulty was remedied about 1872 by the "Ordinary," which had one extremely large wheel in front and a small wheel at the rear. It took a near acrobat to ride it. The bearded cyclist would sit almost directly over the high wheel, which had the foot pedals attached directly to its axle like the earlier Velocipede. Because of rough and poor roads, falls were frequent from the high wheeler, and a fall was no laughing matter from the rider's six-foot or even eight-foot perch.

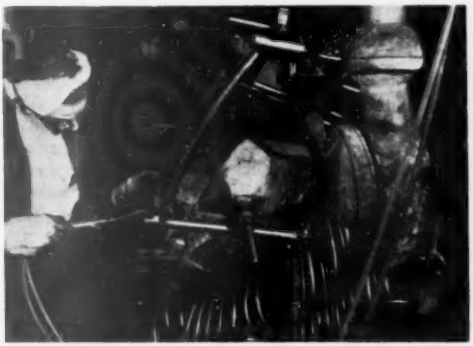
About 1884 an Englishman named Starley conceived the first truly practical bicycle. He placed the cranks and pedals between the front and rear wheels and used a chain drive to transmit the rider's pedalling energy to the rear wheel. The front wheel, used for steering only, was brought down considerably in size and the rear wheel was made larger. The two wheels thus became about the same diameter. With many refinements, Starley's "Safety" is the bicycle our boys and girls ride today.

In 1895 Ignaz Schwinn, an immigrant from Germany, joined forces with Adolph Arnold, of Chicago, to form Arnold, Schwinn & Co. There were then some 300 bicycle manufacturers in the United States, and the industry was accounted one of the country's largest. In 1899 the boom



2—LEFT to right: rear forks with fork ends; head stampings; crank hangers without and with seat posts

3—HALVES of heads are flash welded together. Same process welds the longitudinal seam in crank hangers



4—JOINING the top bar to the seat post is a job for gas welding—using bronze or steel filler rods

5—GAS WELDS with filler rods join the upper stay members and the rear forks to the front harp assembly

for Schwinn Bicycles

To make the best bicycle, weld it. That's the simple recipe Arnold, Schwinn & Co. uses to turn out the frames and others parts for America's best loved bikes.

BY CLYDE B. CLASON

IN APPEARANCE, the bicycle frame has changed but little since the year 1895. The simple tubular structure does not lend itself readily to changes, every one of which involves a number of stress factors to be weighed and considered. Production methods, however, have changed markedly. In 1895, joints were riveted and soldered. Later the entire assembly was braze welded with oxy-acetylene torches.

Today as many joints as possible are flash welded. Flash welding has proved itself to be the most economical method of making a joint. It also produces the strongest welds.

Advantages and Disadvantages

Comments Ed A. Sirabian, welding engineer of Arnold, Schwinn & Co.:

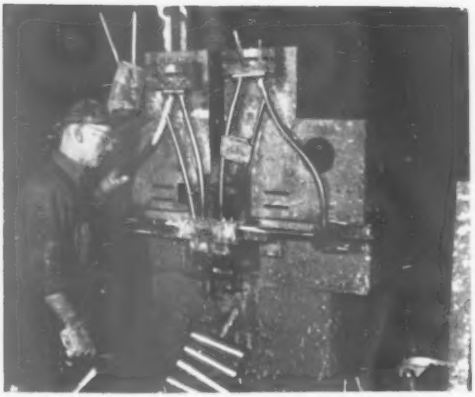
"In the flash weld, the abutting faces have been brought up to welding heat simultaneously; the molten

collapsed and cycle factories were closing by the gross. But the four-year-old firm survived.

In 1908 Schwinn bought out the interest of his partner. There has not been an Arnold in the company since then, but there have been three generations of Schwinns. Second generation is represented by Frank W. Schwinn, now president; third generation by Frank V. Schwinn, vice-president and treasurer, and Edward R. Schwinn, vice-president. The aim of all Schwinns remains that of the company's founder—to make the best bicycles money can buy.

The same aim is shared by the company's welding and design engineer, Ed A. Sirabian.

6—INDUCTION silver-brazing set-up. Worker Edward Luttes loads and unloads four jigs on the two tables



7—CITY GAS silver brazing is used as an alternate method to join center bar to seat post and bottom bar

iron and slag have been squeezed out, and all voids are closed. A cross movement of atoms has taken place across the interface, and no excessive disturbance of grain structure has resulted. These ideal conditions give a weld of 100% strength."

Ideal though flash welding may be from the standpoints of quality and economy, it has its limitations as a production process. For best results, the faces joined must be of the same shape and area, or very nearly so. This means that if you weld a tube to a forging, you must incorporate in the forging a circular protuberance of the same diameter and wall thickness as the tube to be welded to it. Moreover, the parts joined should lie along the same straight line. Where it is not practicable to observe design restrictions, flash welding should not be employed as the production process. Hence several joints in the frame are braze welded, or welded with steel filler rod by the oxyacetylene torch or silver brazed. None of these joints, however, are under strain.

How Frame Is Built

The standard frame for a man's bicycle contains 21 joints, of which 12 are flash welded, 7 are torch welded or brazed and 2 are silver brazed.

In Fig. 1, a photograph of a completed frame, we may see the principal components. The seat post, a 1-in. tube, divides the frame in the center. The section forward of the seat post (left in the picture) has roughly the shape of a harp, and is known as the front harp. The triangle to the rear is known as the rear fork and stay assembly; there are two rear forks and two rear stays, one of each to go on each side of the rear wheel.

Some individual components in the welded frame are pictured in Fig. 2. From left to right, we see: a rear fork member arranged for flash welding and after flash welding; the two components of the head before and after flash welding; the components of rear hub (background) and the crank hanger. At extreme right, crank hangers are shown before and after welding to the seat post.

The lower end of the seat post is flash welded to the crank hanger. The bottom bar, a formed tube, is likewise flash welded to the crank hanger.

The front fork of the bicycle fits into a sleeve known as the "head." This is a flash-welded assembly of two stampings. The bottom bar connects the head with the crank hanger, and the top bar runs from the head to the seat post. Both joints with the head are flash welded. The top bar is torch brazed to the seat post, as are the tubular rear stays. The rear fork members, shaped from tubing, are flash welded to the crank hanger and torch brazed to another assembly known as the kick stand housing.

The center bar, in the front harp assembly, runs underneath the top bar between the seat post and the bottom bar. Both of these joints are silver brazed.

The two rear forks are made by flash welding stampings to shaped tubular members. The shaped tubular members known as the upper stays are likewise flash welded to the rear fork ends. The two rear forks are flash welded to the front harp in one operation.

The frame for the woman's bicycle differs from the man's in only a few (but important) respects. The center bar is omitted, and the top bar is bent down to come relatively close to the bottom bar. A short brace of tubing is introduced to join the top and bottom bars.

Though not integral with the frame, the front fork should be considered along with it. In some bicycles, a lock is installed in the front fork, to lock the front wheel so that the bicycle will always turn in a circle. In these models, the lock bolt housing is flash welded to a tubular piece, and the assembly is flash welded to the fork forging. Where there is no lock, a simple stem of tubing is flash welded to the fork forging.

Flash-Welding Equipment

The company maintains a total of 19 flash welders, of which 13 are 50-kva, four 100-kva and two 150-kva. Weld cycles vary from 2 to 9 seconds, current density is about 10,000 amperes per sq in., and the forging force is estimated to range from 2,000 to 4,000 lb. In a typical flash weld, about 3/16 in. of metal is flashed away from each side of the joint. Because of this intensive flash-

ing, it is not necessary to clean the work in preparation for welding.

Production of a bicycle frame may be said to begin in the tube mill. Schwinn has its own tube mill, complete with five pairs of forming rolls and a 60-kva welding unit. A large copper wheel that looks like a seam-welding wheel produces a continuous butt weld to close the tubing after it has been formed from cold-rolled steel strip.

The various tubular components and stamped parts are assembled for flash welding wherever the process is practicable. Figure 3 shows one of the flash-welding operations: the joining of the two halves of the head. This is done on a 150-kva electronically controlled flash welder at an extremely rapid rate.

Other flash-welding machines weld the rear fork end stamping to the upper stay and the bottom bar to the crank hanger. As a concluding operation, both rear forks are welded simultaneously to the front harp on the same machine.

Gas Welding and Brazing

Where flash welding cannot be employed, braze welding is the preferred method of assembly. In these days of shortages, however, bronze wire is becoming scarce and steel has to be used instead. In Fig. 4, Miss Lorraine Wysocki is using steel filler rod to gas weld the top bar to the seat post. Another skilled woman welder, Miss Frances Ohendoski, may be seen in Fig. 5 making the cluster of torch welds that join the upper stay and rear fork members to the front harp. The welding flux is in the flame.

Silver Brazing Set-ups

The center bar is silver brazed to the front harp. Silver brazing has proved more economical and just as satisfactory as a torch braze weld for the center bar. Production is split between two heat sources: induction heating and city gas. In Fig. 6, operator Edward Luttes is loading a pair of jigs at one of the induction brazing tables. While two assemblies are being brazed at one table, the two jigs at the other table are being unloaded and loaded. One generator serves the coils at both tables.

City gas is also used for silver brazing of the same joints. The set-up is pictured in Fig. 7. Operator Franklin Hart loads and unloads the jigs. The reason why there are two methods for silver brazing is that volume had reached the point where the induction-heating unit alone could not handle the demand. Instead of adding another induction heater, it was decided to install gas equipment and compare the two methods.

The completed bicycle frame (Fig. 1) is given a strength test to make sure that it will not contain defective welds.

8—"TUBULAR" rims for bicycle balloon tires (a Schwinn feature) are formed on the mill at extreme right, then sent through two seam welders

Hubs and Rims

Flash welding is employed extensively on both the front and rear hubs. Some hubs are simply two stampings, flash welded together at the surfaces of smallest diameter. In more complicated types, additional stampings to serve as reinforcing members are inserted before flash welding. After welding, the flash is trimmed off inside and outside the hub, and the part goes to an abrasive belt for polishing.

The "tubular" rim for bicycle balloon tires is a famous Schwinn feature. These rims are five times stronger than conventional rims, as proved by independent testing laboratories.

Steel strip, delivered in coil form, is passed through a mill where ten pairs of bending rolls give it its peculiar contour. The two sides of the strip are folded over and brought together in the center of the rim, leaving corrugated walls at either side of the flat central portion. From the bending rolls, the rim passes through two 150-kva seam welders (Fig. 8). The first seam welder puts a seam inside of the center line, and the second seam welder puts a seam on the outside of the center line. The abutting ends in the center are mashed together so closely by these two seam welds that it looks like a butt-welding operation had been performed.

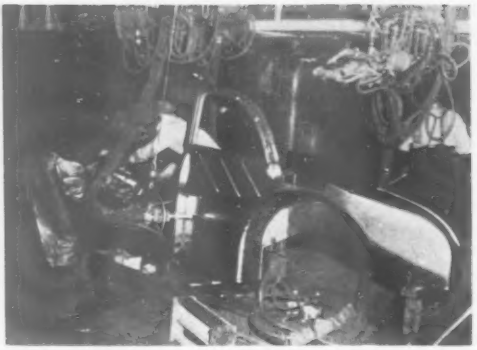
Both seams are continuous and watertight. Still in a straight strip, the seam-welded rim passes through rolls that curl it into a circle and then to a cut-off. Finally, the cut ends of the rim are flash welded together on a 50-kva machine.

Schwinn-made "bikes" are offered for every taste and in every price class. The company has over 50 different models and four sizes to suit age groups from small lads to grown-ups. Oddly enough, the "bicycle built for two" is still a standard production item. Though the demand for tandem models is nothing spectacular, several hundred of them are manufactured and sold each year. Another off-trail item is the "cycle truck," a bicycle designed to carry a basket on brackets extending forwardly over a slightly smaller front wheel. A load of up to 150 lb can be carried in the basket for quick near-by deliveries.

* * *

Acknowledgment is made to the Linde Air Products Co. for valuable assistance in the preparation of this article.

1—GUN WELDING of the rear inner wheel housing is one of the first subassembly operations on the line



2—BODY SIDE less quarter panel (fender). Large press-formed parts are gun welded into this assembly

Willys-Overland

Welds New Family Car

Planning for welded production probably had a lot to do with the exceptionally short time it took to get the "Aero Wing" rolling down the assembly line.

BY W. C. HENZLIK

NEWEST entry in the low-priced car field is the Willys-Overland "Aero Wing." Its appearance marks the first Willys family car since the "Americar" of 1942. Ever since the war, the "Jeep" and its cousins the "Jeepster" and "Jeep Station Wagon" have been the mainstays of the Willys line.

The new Willys is the outgrowth of design studies started several years ago by C. R. Paton, who subsequently was named director of engineering for Willys-Overland Motors Inc., Toledo, O. It is featured by a completely new 90-hp "F-head" engine and by a truly all-welded body with practically no other connections than spot, arc and gas welds. The front fenders, the grille and other parts that are bolted onto the front constitute the only exceptions to the all-welded construction.

"Comfort with ruggedness" might be a good selling slogan for this latest welded automobile. Seating width, both front and rear, is 61 in.—within 3 in. of the widest seats in any car made. There is generous accommodation for six passengers.

Planning for Production

After considering all factors involved, including the defense emergency, the management of Willys-Overland decided to go ahead with production. Final go-ahead for the car was given Oct. 23, 1950, and the first car rolled off the line Oct. 4, 1951.

To the efforts of the Willys engineering staff, the resistance-welding industry contributed the fruits of many years of development on series welders, portable gun welders, special electrodes and controls.

A veteran auto body concern, Murray Corp. of America, was chosen to make the entire body assembly. The bodies are fabricated in the Murray plant in Detroit and then shipped 65 miles south to Toledo for assembly with engine, transmission, wheels, steering gear and equipment.

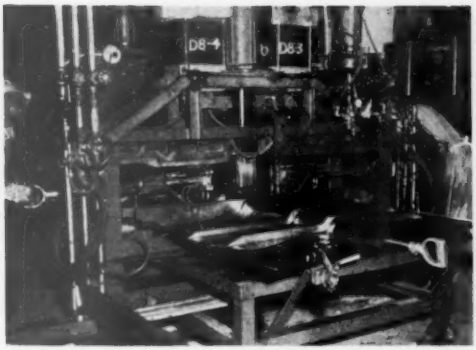
Murray Corp. has established a 500-ft-long welding assembly line for the Aero Wing body. Spot-welding stations are located every few feet. Formed sheet-metal parts and stampings from other Murray buildings are channeled to the third floor of the assembly building to start their trip. Parts for floor pans, roof rails, side rails, side panels, mounting brackets, wheel housings, etc., are fed into the line from stacks or racks positioned alongside it. Efficient use of both stationary and portable jigs and fixtures is characteristic throughout the plant.

The rear inner wheel housing assembly, including brackets and reinforcements, is mounted in the wheeled jig shown in Fig. 1. Here two operators make 40 welds with 50-kva welding guns. Thickness of most of the wheel housing parts is 18 gage on the front and 19 gage on the rear.

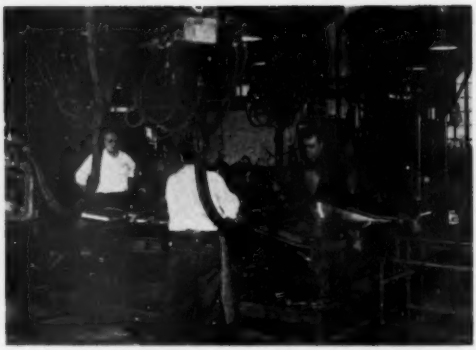
Another subassembly operation down the line joins several large press-formed parts into a body side complete except for the fender. Welded into a single sturdy assembly (Fig. 2) are the pillars, roof rails, rocker panels and the wheel housing subassembly mentioned above. Design of the mating parts usually provides a 5/8-in. flange, in which the operator must center his spot weld.

Expansion Spot Welding

An out-of-the-ordinary type of spot-welding application joins the front floor pan to the rear floor pan assem-



3—EXPANSION series welds join the front and rear floor pan sections. Details shown in sketch, Fig. 5



4—ENTIRE floor pan assembly is welded together at this station by four operators using 50-kva guns

bly (Fig. 3). Some 64 series-type "expansion" welds bond the two sections. The term "expansion" is used because both electrodes are on the same side of the parts to be welded. A pressure device moves (expands) the electrodes toward a copper back-up bar to squeeze the parts against it and make two welds at the same time (see Fig. 5).

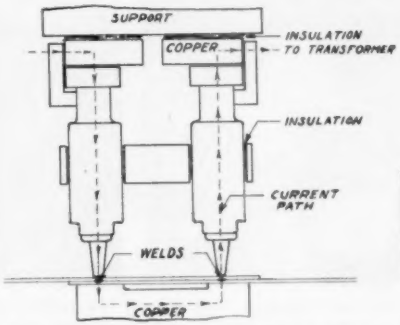
Indirect Gun Welding

For welding the clinched flanges of door assemblies, an indirect gun-welding operation is used, as is indicated by the schematic drawing (Fig. 6). No weld is made between the inside sheet and the outer surface because of finishing considerations, yet the fastening is secure.

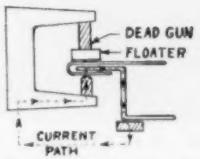
Before the side rails can be welded to the floor pan assembly coming down the line, it is necessary to prevent corrosion and eventual deterioration of the metal between weld nuggets. A special spot-weld sealer is used. An air-powered gun lays a 3/32-in. diam bead of the gooey compound along the flange of the floor pan. They think of everything here: the sealer contains a metallic substance to conduct the welding current between the side rail and the flange. Thus the welding circuit is not impaired.

The floor pan assembly is shown in Fig. 4. Four 50-kva portable gun welders are used to fasten rear side sill assemblies and front floor pan supports here. Note the massive holding fixture on which the floor pan is resting. At this station, 107 welds are made.

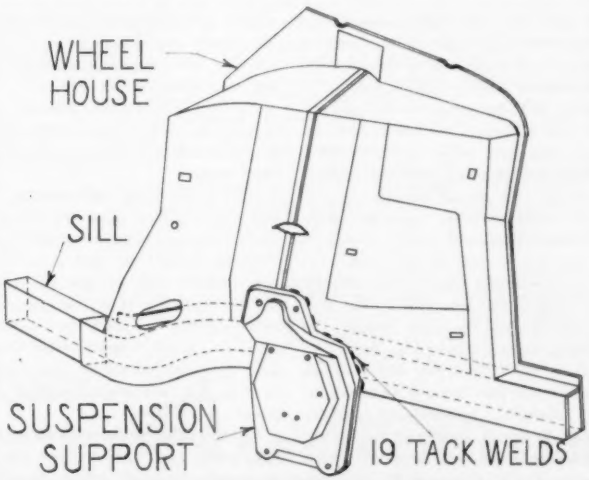
While the floor pan is moving down



5—TYPICAL set-up for the "expansion" series welds made to join floor pan sections

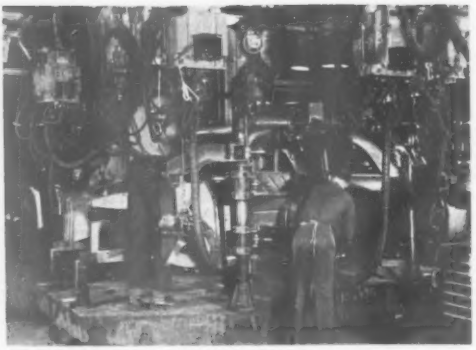


6—TWO surfaces are welded but not three



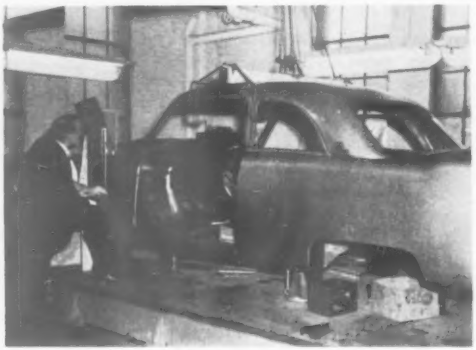
7—FRONT suspension support on the inner wheel housing. This arc-and-spot-welded assembly is perhaps the most highly stressed of all

8—GAS-WELDED reinforcements on body side panel include ½-inch tacks near lock pillar and side sill



9—BODY is welded together from floor pans, roof and side panels. The massive jigs preserve alignment

10—70-FT-LONG booth for arc welding. Note the hole for gas tank, right of the license plate space



11—INSPECTION. With gages and the precisely located supports, difference of 0.001 in. can be noted

the line, the side panel also acquires more reinforcements and additions. Figure 8 shows an oxyacetylene welding station where weldors make: (1) a 2-in. joint between roof rail and pillar and (2) six ½-in tacks between roof rail and pillar reinforcement. Along the roof rail near the header, a ½-in. tack is gas welded. Several ½-in. tacks or braze welds are made between pillar and rocker panel. A ½-in. tack is securely gas welded between the fender panel flange and the roof rail at the rear end of the drip moulding. Six or eight similar gas welding tasks are also done here.

Body sides, floor pan and roof are next joined into a rigid structure in the massive spot-welding fixture shown in Fig. 9. Design of the mating components provides a single box-section structure around the door and window openings to give great torsional rigidity. Where side pillars and floor pan fit together at the rocker panels, a triple box-section is formed. Thus body and chassis are one integral unit. This results in a weight saving of at least 100 lb. Altogether, 33 spots are made in 48 in. between each side of the rocker panel and side sill and filler. Spot-welding sealer is also used here.

This big welding task requires 70-kva gun welders, automatically controlled by synchronous weld timers. Preheat, weld time and forge time are matters out of the operators' hands. However, it is the operator's responsibility to place the spots in proper spaced relation—one every inch in stressed locations; one every 2 or 3 in. for fastening or sealing purposes.

Control cabinets for both series and automatic gun welders are always mounted overhead where possible. The comparatively delicate electronic tubes, mounting and other breakable parts are safer out of the way of lift trucks, tote boxes, assembly machinery, etc. The only people authorized to go near these controls are specially trained welder control maintenance men.

Arc-Welding Jobs

After the sides, floor pan and roof have been assembled, considerable arc welding comes into play. The assembled bodies move on a chain drive down a specially constructed welding booth that is 70 ft long (Fig. 10). Overhead ventilators are built into the welding booth so that the air is always free from fumes.

While the bodies are moving at a rate of 17 feet per minute, as many as three or four weldors clamber in and out to make reinforcement welds. They use E-6010 or E-6012 electrodes with a current of about 175 amp. Mounting brackets are attached, and other welds are made that could not

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be reached efficiently or conveniently by gun welding operations farther back on the line.

Reinforcements include: four ½-in. tacks on each side of the body frame between the lock pillar and wheel house and the floor extension and sill, four ½-in. tacks each side rocker panel to front floor pan and pillar, three ⅜-in. tacks between each side pillar and outer wheel house, four ½-in. tacks between each side pillar and dash panel, three ½-in. tacks between each side roof rail and header, two ¼-in. tacks between each side roof rail and back window strainer.

Near the welding booth is completed an arc-and-spot-welded assembly that is perhaps the most highly stressed in the whole Aero Wing. This is the front end suspension support and bracket assembly. Heavy welds with E-6010 electrodes are made for reinforcing the support and for joining it to the panel assembly. The perspective drawing (Fig. 7) shows the 19 tacks (each of ¾-in. length) that fasten the support to the panel.

All arc and gas weldors in the Aero Wing line are trained at a welding school run by the Murray Corp. The school trains men in the fusion welding of mild steel, stainless and other metals. Bob Clover is instructor. The operators of welding guns are given "on-the-floor" training by a leader or a foreman at the particular assembly station.

Inspection Procedures

It's important to make sure that all components and subassemblies will fit when it comes to join them into a body. Constant checks are made by leaders, foremen and welding operators. Whole bodies (Fig. 11) are taken over periodically to the inspection department for comparison with master gages and fixtures. All body fits are examined; *i.e.*, how the hood fits into the side panel and the hood ledge, how the window "reveals" compare with specifications, etc. Special dummy doors are set in the door openings to see how clearances are being maintained.

Precisely dimensioned supporting rests under fore and aft bearing points give a quick comparison of production wheel openings, suspension supports, brackets, etc. If some parts are not in correct relationship, the trouble is traced back to the assembly location that is causing it.

The body gets final reinforcing gas welds just before it reaches the end of the line. Some jobs here are ½-in. tacks on the rear window reinforcement to package tray and ½-in. tacks between side members or risers to wheel housings.

The author is indebted to Mr. Raymond Rausch, C. R. Paton and Arthur Cox, of Willys-Overland, and Jim Smith and Leo Sloan, of Murray Corp. of America, for the generous help and friendly coöperation they extended in the preparation of this article.

Keeping up with the Taxes

No. 4: Traveling and Entertainment

BY HARRY H. ROSE

As a partner in the public accounting firm of Traeger & Rose, Cleveland, Harry Rose is an authority on "down-to-earth" tax law.

THE HANDLING of traveling and entertainment expenses will depend upon which of the following categories the taxpayer falls into:

1. An independent contractor
2. An employee:
   (a) Traveling in-town or out-of-town?
   (b) Are the in-town traveling and other expenses reimbursed?

An independent contractor's expenses are business or professional expenses. But the services of an employee are not considered to be a business or profession. Only the employee's reimbursed expenses, plus his out-of-town traveling expenses whether reimbursed or not, are permitted to be deducted as business expenses. All other expenses of the employee are treated as non-business expenses.

This distinction in treatment results in different tax bases and may result in a difference in taxes between a reimbursed and non-reimbursed employee, despite the same income and expenses for each. The non-reimbursed employee cannot deduct for in-town traveling, entertainment and sales promotion, considered as business expenses.

There is some conflict as to the meaning of "out-of-town." The Bureau contends that you have to remain away over night, but the Tax Court has ruled that "out-of-town" means just what it says, that you do not have to remain over night (12 TC 414). Since the Commissioner has not acquiesced in this decision, it would be better to comply with the Bureau's ruling unless you want to take it to the Tax Court.

The employee's reimbursement must be included in his gross income if he does not have to account for it to the employer. If the expense, other than for out-of-town traveling, is greater than the reimbursement, he may deduct the excess under non-business deductions on page three of Form 1040, or waive it as part of the standard deduction.

On a non-reimbursed basis, the employee can deduct as business expenses from gross income (on page one of Form 1040) only traveling, meals, lodging and auto expenses incurred while out-of-town. Local traveling, auto, entertainment, sales promotion and other non-reimbursed expenses can be deducted only under non-business deductions on page three.

The burden of proving these deductions is upon the taxpayer.

Where the employee is reimbursed on the basis of an exact accounting for his expenses, the employer does not have to report it as an advance on Form 1099 (Mim 5947). By parity of reasoning, such payments would not be income to the recipient (37 BTA 494). They are advances by the employee for the employer and are not to be included in the recipient's income (Leicht, BTA Memo 90773). The fact that the employer advanced the money in the first place should make no difference as long as the employer considered it as an advance and not as an expense.

RESISTANCE WELDING HIGH-TEMPERATURE ALLOYS?

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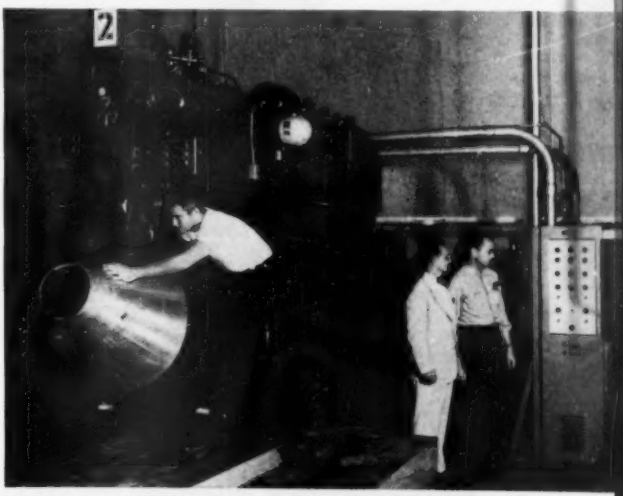
General Electric has supplied, and used, both types to meet Army-Navy specifications, and our nearest local office can give you information based on experience with this equipment and with welding high-strength alloys. Before you buy—investigate. Write for bulletin GED-1512, or contact the nearest G-E sales office. *General Electric Company, Schenectady, N. Y.*

Ask your resistance welding manufacturer, power supplier, or nearest General Electric office for a FREE showing of the sound and color movie, "This Is Resistance Welding." Describes various welding methods and processes. For production and engineering personnel training and refresher courses.

H. C. Wolfe, of the General Electric Electronics Laboratory Welding Section, says, "Tests in our Laboratory and in other General Electric Welding Laboratories showed that single-phase a-c welding using Slope Control was as good as three-phase welding on aluminum. So, for Class A spot welding of aluminum, the use of our a-c machine with Slope Control certified to Military Specification MIL-W-6860 for .125-.125" 52S¼H aluminum has resulted in a considerable saving of money and time."



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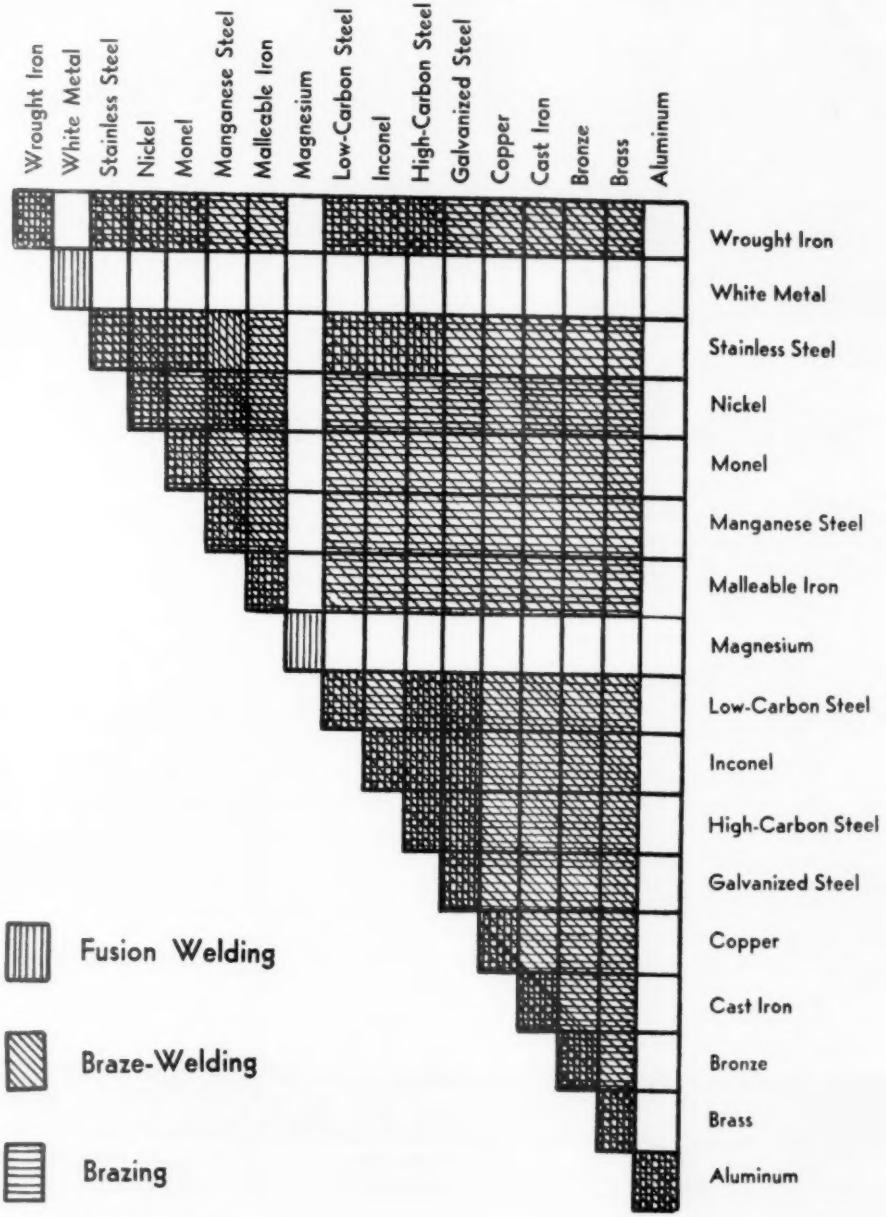
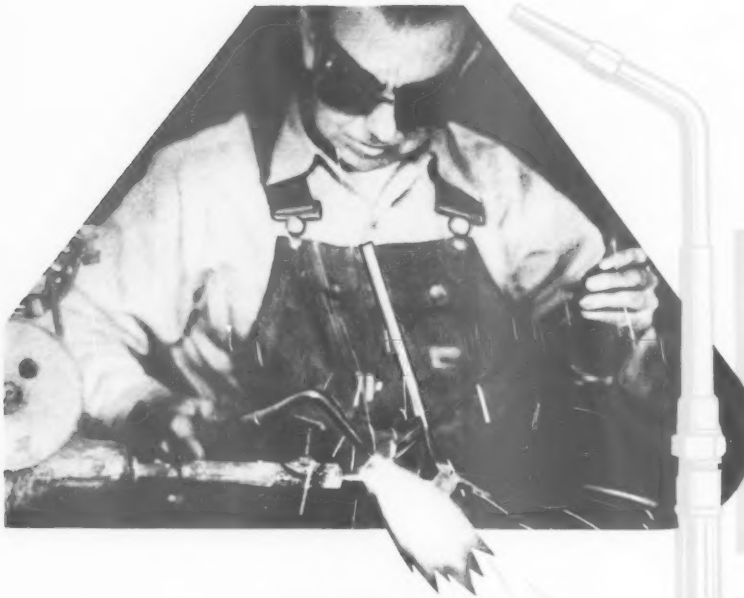
Jiffy Joining Chart

GAS-WELDING processes you may select in order to join a given material to a similar or dissimilar metal. As an example, take malleable iron. You can fusion weld it only to itself, but you can join it to everything except aluminum, magnesium, or white metal by using either brazing or braze welding. Aluminum, as another example, can be joined only to aluminum, but either fusion welding, braze-welding or brazing may be employed.





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This man with a VICTOR torch welds mild steel extension handles onto high carbon pliers—a small and ticklish job. The same torch, by simple change of nozzles and tips, can be quickly converted to new job needs, such as welding large castings, heating, brazing, descaling, flame priming, soldering—or to cutting, by addition of cutting attachment.

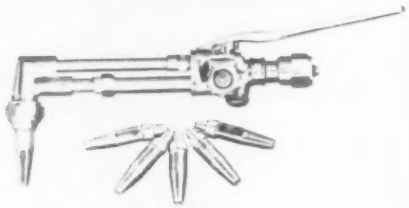
VICTOR's precision-built apparatus also gives you better flame control, saves gas, gets work done faster. Ask your VICTOR dealer for an on-the-job demonstration NOW.

LOOK FOR THE VICTOR DEALER SIGN!

VICTOR

Welding and Cutting Equipment

Model 2450 Cutting Attachment for VICTOR 300 Series Welding Torches cuts metal up to 8" thick.



Ask him to show you why it costs less to own and operate VICTOR.

Dealer inquiries invited.

VICTOR EQUIPMENT COMPANY

3821 Santa Fe Ave.
LOS ANGELES 58

844 Folsom Street
SAN FRANCISCO 7

1312 W. Lake St.
CHICAGO 7

Where you will find THE REAL REVOLUTION

"If we keep in mind the values of opportunity, competition, democracy, productivity, then it is our capitalist society which is the truly revolutionary one – the only society which offers true hope to the masses for release from the long nightmares of tyranny. It is we, not the Marxists with their reactionary ideas of the good dictator, who have the truly constructive, the truly revolutionary ideal."

– from "Capitalism" by David McCord Wright.

If we can only win recognition of this truth, we shall win the struggle of free men against communism. This editorial discusses some of the hurdles that must be cleared.

To win the needed recognition that "our capitalistic society... is the truly revolutionary one," we must keep pounding away both abroad and at home. That is because the communists simultaneously attack us on an international front and try to undermine us from within.

The present drive to rearm ourselves and our allies is crucial to our self-protection on the international front. We must be prepared to meet the armed force of aggressive communism with armed force if we are to secure our physical freedom.

Arms are not enough

But to re-establish parity in arms is only half of the battle. In the last analysis it is not the more important half. To be effective, our arms must be backed by loyalty of men to our ideals. So, both abroad and at home, we must win men to the faith that we do have "the truly constructive, the truly revolutionary ideal."

On the international front, the effort to win adherence to such faith in our capitalist society meets tough going. That arises from the fact that in some of the countries that are allied with us in the fight against communism, capitalist society has offered to its people no such ideal. In varying degrees "the values of opportunity, competition, democracy, productivity" – those key aspects of American capitalism–are either absent or subordinated in their economic life. Indeed, the *Wall Street Journal* recently remarked that "to the European, capitalism has become synonymous with cartels – and with the disregard cartels foster for the consumer, the worker and the over-all well-being of the nation's economy."

No Simple Solution

Nonetheless, many European labor and governmental leaders sincerely believe that cartels are essential to their economic salvation. They believe that without such restrictions in congested European markets there would be intolerable cut-throat competition and instability of employment. Thus, when we point out that the cartel capitalism so prevalent in Europe lacks the constructive qualities of competitive American capitalism, we may offend European leaders whose wholehearted cooperation we need in the fight against communism.

But, if we soft-pedal that contrast, we sacrifice the opportunity to win understanding and loyalty from millions of Europeans who have had no chance to learn that capitalism can be the constructive and liberalizing force that it is in the United States. Indeed, when many of these millions embrace socialism it is not because they love it. They are rather desperately seeking a tolerable middle course between what they consider the hateful extremes of communism and the undesirable aspects of capitalism as they understand it.

New name not the answer

We know that there is no easy way to handle the problems created by such misunderstanding of American capitalism. Neither do we share the belief that much of the difficulty would be overcome if we were to call American capitalism by some other name. By doing that, the argument runs, we shall relieve it from the unpleasant connotations that are attached to the word capitalism in some other parts of the world. But, after all, if we are to give up all the terms that have come to mean something else in other parts of the world, we must begin by ditching the term "democracy" which, in the official jargon of the Kremlin, seems to mean what we call dictatorship.

In spite of the difficulties, however, we must stick to this job of exporting the truth that our capitalist system does offer opportunity, competition and democracy. We must let the rest of the world see that it means a continuous drive for increased productivity, and the search for profits by increasing sales and consumption, not by trying to sell less for more.

Export alone not enough

The spreading of truth about American capitalism will not be effective if it is merely directed abroad. Unless it is carried on at home also, it will lack the driving faith that is essential to any convincing export of this type. Nor will export alone come to grips with the communist attack on our country from within—an attack that gets too much help from loyal Americans who short-sightedly repudiate the basic principles of our institutions in their efforts to reform some of their deficiencies. For success both at home and abroad, we must have right here at home a much more militant recognition that it is in fact our capitalist society which offers "the truly constructive, the truly revolutionary ideal."

Here at home, too, this raises difficult complications. Businessmen who are among the leaders and principal practitioners of capitalism, have generally been catalogued as conservatives. Hence, many people must stretch their imaginations a bit to see that businessmen are leaders of a development which has so greatly and so rapidly improved the lot of free men in America that it is truly revolutionary.

These difficulties of definition, however, are relatively superficial aspects of the problem of seeing our capitalist society clearly. The basic facts are that:

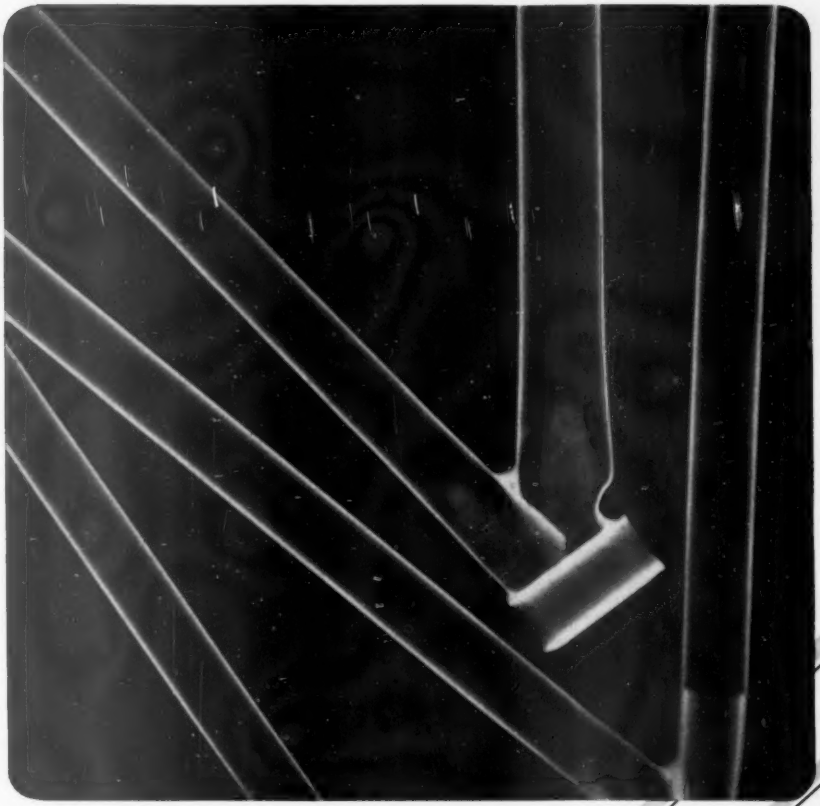
American capitalism is leading free men to an ever higher material standard of living while respecting their spiritual, social and political freedom.

Communism is leading its people back into a life of servile regimentation under dictatorship.

American capitalism advances to high ground never before attained by free men. Communism retreats to ground that men with an appetite for freedom throughout the ages have sought to escape. If we can establish this truth firmly, around the world, we shall no longer need to worry about communism. It will be hopelessly sunk.

McGraw-Hill Publishing Company, Inc.

Radiography checks—



then double checks

LANDING GEAR STRUTS lead a life of punishment. Though light, they must be strong. Their joints must be sound. Radiography is the method used to prove them sound.

A maker of amphibian aircraft goes even further. Though treated and sealed, strut members can develop internal corrosion and become weakened. Radiography alone can provide the required nondestructive examination of these internal surfaces. So it has become routine to x-ray these struts as part of the periodic inspection of the planes.

This is but one example of how radiography is proving a boon to the welding process. It is helping to open new fields for the use of welding—especially in the fabrication of highly stressed products and assemblies.

Look into the ways Radiography can aid your business. Your x-ray dealer will be glad to give you full information and assistance.

EASTMAN KODAK COMPANY
X-ray Division, Rochester 4, N. Y.

Radiography—

another important function of photography

Kodak
TRADE-MARK

New Products . . .

NAIL WELDER cuts fastening costs for blanket insulation of ducts in air-conditioning or heat systems

PRE-SPOT-WELD Cleaning of aluminum can be tested with new meter. It tells if oxides still remain

Stud Welder for Nails

250 A NEW small Graham stud welder has been developed for use by the construction industry where it is necessary to fasten nails or pins to galvanized sheet steel. This process is claimed to greatly cut the cost of applying blanket insulation to air conditioning ducts and heating systems.

The new stud welder is portable, weighing only 130 lb, and can be connected to either 110 or 220 volt, 60-cycle power sources. Its operation is based on the stored energy principle.

Studs are loaded by hand into the collet of the simplified welding gun. By applying a small pressure to the spring-loaded stud holder, the gun is fired. No source of compressed air is needed, as with larger capacity Graham stud welders.

GRAHAM MFG. CORP.

* * *

Test Welds Magnetically

251 WEAK or potentially troublesome welds in stainless and Inconel can now be detected by the use of the "Magne-Probe." Principle of operation is based on the fact that magnetic permeability of stainless and Inconel increases in direct relation to heat-caused changes in crystal structures.

The "Magne-Probe" is a sensitive and stable bridge that measures the inductance of a coil, so constructed as to make the material under test its core. Inductance of the coil is proportional to the permeability of the stainless and, therefore, a measure of the amount of heat-corrosion that has taken place.

The instrument was developed to test aircraft exhaust manifolds, collector rings, headers and tail pipes and is the work of an engine inspector at a West coast airport. The "Magne-Probe" consists of a probe about the size of a watch, a 2 by 3 by 4½ in. indicating meter and a 5-ft flexible cable. It utilizes an a-c power source.

AMERICAN INSTRUMENT CO., INC.

* * *

Self-Measuring Cable

252 CONVENIENT measuring of Bronco 60 Neoprene-jacketed welding cable is made possible by vulcanized brands at precise 2-ft intervals. Legend impressed into the jacket includes the name, type, number of conductors, size, rated voltage and the flameproof registration number of the U. S. and Pennsylvania Bureaus of Mines.

WESTERN INSULATED WIRE CO.

* * *

Goggle Cleaner-Sanitizer

253 PERSONAL safety equipment, goggles, faceshields, respirators, mask facepieces, etc., can be cleaned and sanitized thoroughly and quickly with new "MSA Cleaner-Sanitizer." It comes in dry powder form in 1-oz. packets, each of which is added to 1 gal. of warm water as needed. Frequently cleaned safety equipment is far more readily accepted by employees, states the company.

MINE SAFETY APPLIANCE CO.

Test Pre-Weld Cleaning

254 NEW meter tests the cleanliness of aluminum sheets after they have been prepared for spot welding. It measures the surface electrical resistance, which varies directly with effective removal of oxides or soils.

The Model 151-S microhm meter measures the total surface resistance of two sheets, or coupons, when they are placed between dummy electrodes. It is a shop instrument, designed for rugged service with reliability. The case is oak with a waterproof finish. Total weight including batteries is 22 lb.

J. W. DICE CO.

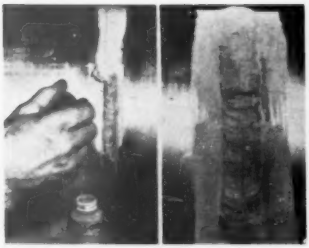
* * *

Better Belt Grinding

255 A NEW "universal hub" contact wheel for belt grinders is said to cut contact wheel replacement costs in half. Called an entirely new concept in belt grinding mechanisms, the three-part bolted metal assembly includes a flanged hub, a serrated rubber tire and a side plate. Worn out tires are discarded and replaced by new ones at half the cost of contact wheels. A single hub and plate combination will mount a variety of tires varying from ¼ to 6 in. in width and from 5 to 105 durometer in hardness. It is thus possible to grind everything from rough jobs down to the finest finishes with the same hub. A special "61" rubber tire causes a controlled breakdown in the abrasive to double former production.

THE CARBORUNDUM CO.

For more information on these products, fill in item numbers on cards, pages 17-18



Dye Inspection Process

256 A NEW penetrant dye inspection process, "Met-L-Chek," is claimed to show up cracks, pores and cold shuts in all types of metal parts. Manufacturer states that only two solutions are required to carry out the inspection. Parts are first swabbed with red dye penetrant; after three minutes the surface dye is washed away with water. Part is then swabbed with white developer which after drying shows up defects as brilliant red lines.

MET-L-CHEK CO.

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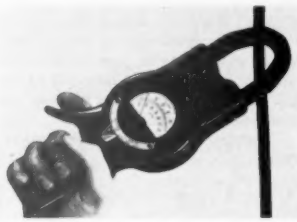


Measures Weld Current

257 TONG-TYPE volt-ammeter measures welding voltages and currents without breaking the circuit. Called the Columbia Type AC-1, it is put in operation by opening a pair of jaws so that they encircle a power cable or bus bar. When the trigger is pressed, the current can be read directly off the dial. For measuring voltage, the operator can quickly and safely plug voltage leads into the handle of the instrument. Voltage ranges and current ranges are available up to 600 volts or 600 amps.

COLUMBIA ELECTRIC MFG. CO.

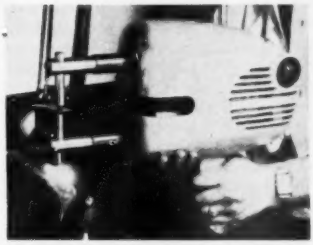
* * *

Aluminum Brazing Alloy

258 NEW aluminum brazing alloy called "Brazinal" is said to be usable without fluxes. It melts at 880 F and has a tested strength of 45,000 psi and a Brinell hardness number of 80. Advantages noted by the manufacturer are elimination of highly skilled labor for high-temperature brazing, elimination of corrosive fluxes and expense of joint cleaning, good corrosion resistance in salt spray and acid conditions, and minimizing of warpage. "Brazinal" comes in triangular cross-section rods in 12, 15 and 18 in. lengths.

A. E. ULLMANN & ASSOCIATES, LTD.

* * *



New Portable Welder

259 A NEW thyratron-controlled portable spot welder is claimed to spot weld up to ¼ in. combined thickness of mild steel. It operates from a 220 volt 60-cycle power source and has an average line draw of 45 amp. Weight of the welder is 25 lb.

The timing control for producing welds of consistent quality consists of an electronic switch and a timer that can be pre-set for correct welding time. The switch is triggered when the welding tongs are exerting maximum pressure on the workpieces. Weld current flows through both thicknesses of metal until the pre-set timer shuts it off.

THE AMPOWER PRODUCTS CO.

* * *

75-Ton Turning Rolls

260 NEW heavy duty turning rolls have a capacity of 75 tons with one powered roll and two idlers. They can handle vessels up to 14 ft in diameter. Variable speed transmission and gear reducer provides a turning rate of 5 to 40 ipm. The 5 hp motor has a reversing magnetic starter and anti-jog reversing relays. Rubber tired wheels are 22 in. in diameter and have a 21-in. face.

THE REED ENGINEERING CO.

Simplified Weld Control

261 EASIER installation, less maintenance, smaller size and greater mounting versatility are claimed for a new Square D nonsynchronous spot welder control. The drastically simplified NEMA 3B weld and sequence timing circuit requires only 4 tubes, valve relay and firing relay.

Interchangeable 3B and 5B timer panels are quickly detached from the door. Plug connectors to the power pack in cabinet allow easy replacing.

Enclosure design permits wall or side-of-machine mounting with the same controller and without relocating the adjuster dial assembly.

SQUARE D CO.

* * *

Keeps Electrodes Dry

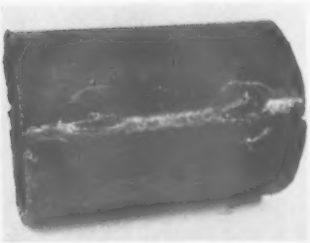
262 GLOVED hands can easily open the oversize door latch on the Despatch Model WRD-1 electrode drying oven. Ten separate compartments in the square, compact case will hold up to 250 lb of rod.

Reinforced mesh shelving permits efficient circulation of heat to prevent any moisture absorption by the electrode coatings. Consistently dry electrodes insure minimum rewelding due to under-bead cracking and porosity.

The rugged construction of the oven is matched by its baked wrinkle finish for withstanding rough shop use. Other uses suggested by the manufacturer for the oven are aging, drying, dehydrating and preheating tasks.

DESPATCH OVEN CO.

For more information on these products, fill in item numbers on cards, pages 17-18



Electrode for Gouging

263 GOUGING out defective weld metal or chamfering of plate edges is said to be greatly speeded by "ChamferTrode." This new d-c electrode is claimed to remove metal so swiftly that the surrounding area has little time to heat up. A heavy electrode coating is said to form a cone that concentrates the arc for fast action.

No oxides or slag are left on the gouged surface, says manufacturer, enabling brazing or welding operations immediately afterward. The specially designed heavy coating allows the operator to place the tip exactly where he wants it since the arc delays in striking long enough for him to lower his helmet. No oxygen, compressed air or other devices are needed with the "ChamferTrode."

EUTECTIC WELDING ALLOYS CORP.

* * *

New M&T Welders

264 A NEW line of Metal & Thermit a-c welders has been completely redesigned to provide longer life, better performance and operating ease. Silicone insulation on the coils is said to give protection against moisture and chemical fumes as well as current overloads. A low open-circuit voltage is combined with a stabilized arc circuit that incorporates capacitors in the secondary. Third main feature of the new welders is an automatic "hot-start" that gives just the right amount of current boost to strike an arc at any current setting. The new M&T welders come in 200, 300, 400 and 500 amp ratings.

METAL & THERMIT CORP.

* * *

Oil Tool Hard-Facing

265 A NEW hard-facing electrode for manual a-c/d-c application is especially useful for rebuilding such oil field tools as churn drill bits, tool joints, clutch jaws, fishtail and cable tool drill bits, impeller tips, kelly bushings, pump-shafts, sleeves, twinpins, etc. Called "Mir-O-Col No. 7," it is claimed to have a low price that makes heretofore borderline cases into good hard-facing investments. The cast-alloy rod contains chromium, nickel, iron and other alloys and produces a deposit of 54-57 Rockwell C.

MIR-O-COL ALLOY CO.

* * *

Measures Weld Preheat

266 A NEW General Electric hand pyrometer measures rapidly and conveniently the temperatures of preheated weld joints, metals used in die casting, etc., liquids and gases. Called the FH-1, it has two heat ranges on its 3½-in. scale, 0-500 F and 0-1,500 F. With extension arms and a choice of three thermocouple tips, the pyrometer may be placed easily in a readable position. The tip shown above is for surfaces over 500 F; a two-prong tip is supplied for use at temperatures below 500 F on such materials as copper and aluminum. An "immersion" tip is made of stainless steel and can be used in gases, liquids and molten metals.

GENERAL ELECTRIC CO.

Rust-Inhibiting Cleaner

267 A NEW emulsion cleaner, Pennsalt EC-51, not only cleans steel parts but gives up to six weeks protection from rust. It also cleans nonferrous metals without staining or etching. It is a good pre-paint cleaner also, says the manufacturer.

PENNSYLVANIA SALT MFG. CO.

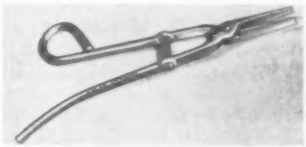
* * *

Wavy-Edge Abrasive Belt

268 Said to be the first major innovation in abrasive belt design in 20 years, a new "Scallop Edge" belt has been brought out by Minnesota Mining. In use, the scallops of the belt curve around the edges of the contact wheel—small radius grinding and filleting can be thus done that formerly required hand work. Major use at present is in automatic precision grinding and finishing of jet aircraft engine turbine and compressor blades.

MINNESOTA MINING AND MANUFACTURING CO.

* * *



Hot Metal Tongs

269 A HUSKY set of new safety tongs features drop-forged steel construction and long, broad nose members for a firm grip. The nose pieces are also thin at the tip for ease in removing blanks from presses, selecting and removing single sheets, handling small hot weldments, lifting parts from solutions, etc. By heating the nose sections it is possible to reshape them as desired. The tool is also made with a guard over the spring for index-finger guiding.

ATLAS WELDING ACCESSORIES CO.

(More New Products on Page 96)

For more information on these products, fill in item numbers on cards, pages 17-18

With **ANACONDA Welding Rods** this shop lives up to its name — **and cuts costs!**

Weldone Welding Associates use ANACONDA-997 (Low Fuming) Bronze for braze welding textile machinery and general repair work

Weldone Welding Associates are located in this substantial shop in Charlotte, N. C. There, Mr. Locke has additional reason to prefer AnacondA-997. Its low fuming qualities are important to the comfort of his welders.

Glenn Hipps, left, shop foreman, stands by approvingly as Dale Locke, owner, braze-welds small gas tanks for chain saws. Mr. Locke points out that welds made with AnacondA-997 successfully withstand the vibration of these saws.

"I can't recall any job in my experience," claims Dale Locke, enthusiastic owner of Weldone Welding Associates, "where bronze pulled apart. It's faster, has greater penetration, a lower melting point and better free-flowing qualities."

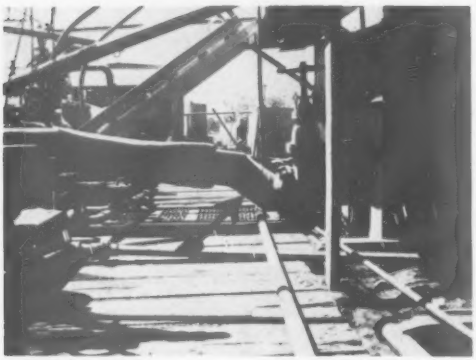
Mr. Locke's thriving business serves an area within a 50-mile radius of Charlotte, N. C., and 90% of his repair work is on cast iron. For this work ANACONDA-997 (Low Fuming) Bronze Rods cost less because they flow better and therefore give more welds per rod. In his opinion they also give faster, better welds with less flux than competitive rods. In the Weldone shop, bronze welds – despite their high tensile strength – can be easily machined. Less preheating is required in repairing castings. ANACONDA Rods flow before such castings as cylinder heads and motor blocks get hot enough to warp or crack.

Weldone buys ANACONDA Welding Rods from National Welders Supply Company in Charlotte. Dale Locke's jobber salesman is himself a practical welder and contributes helpful welding suggestions. You, too, will find experienced service available from your own ANACONDA Welding Rod Distributor. For practical advice on welding problems in your shop consult him ...and for the latest information on welding procedures write today for free Publication B-13 to The American Brass Company, Waterbury 20, Conn. In Canada: Anaconda American Brass Ltd., New Toronto, Ont.

braze or weld with confidence

ANACONDA®
WELDING RODS

on the job



OFFSET connection to valve flange (arrow) minimizes angle to which the costly suction hose has to be bent

Courtesy Linde Air Products Co.

TURNTABLE has been rotated 90 degrees, enabling operator to begin new cut at right angles to first one

Longer Lived Suction Hose

By Elton Sterrett

THE SUCTION hose used between the mud tanks and the pumps on an oil drilling rig is from 8 to 12 in. in diameter and is a complex structure with steel reinforcements to prevent collapse under high suction heads. Though flexible within limited scope, it will wear out rapidly if it is bent severely.

By fabricating an offset connection, the weldor for one drilling contractor made it possible for the hose to be used practically in a straight line. The connection to the mud-tank valve flange is offset nearly a full diameter in little more than that length. The offset is welded to the companion flange at one end and to the hose nipple at the other. By shifting the bolt circles on the two companion flanges at the valve, the offset unit can be used vertically, horizontally or any combination of the two; it is bolted together so as to give the most direct lay possible for the hose.

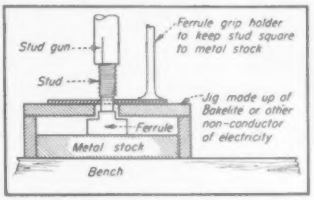
The picture at top left shows how the offset is joined to the hose and to the valve.

Since making the offset connection, the contractor reports that the life of the hose has more than doubled. This is a considerable saving since the hose is a $500 item—on the 12-in. size, $750.

* * *

Jig for Stud Welding

THE TANK and plate shop of the Allis-Chalmers Mfg. Co., Milwaukee, welds a lot of studs to pieces of metal stock 3 and 4 in. long. This entailed the operations of layout and centerpunching prior to stud welding with the stud gun. In spite of due care, many times the stud was not perpendicular to the metal stock.



JIG KEEPS studs perpendicular, prevents burning of ferrule grips

So as to dispense with the layout process and overcome the alignment difficulty, John E. Heritsch, an Allis-Chalmers weldor, suggested a jig with parts of Bakelite or other non-conductor of electricity to prevent burning of the ferrule grips.

This jig arrangement (see sketch) has saved considerable time and labor and has also eliminated the expense of wasted ferrule grips.

* * *

Cable Life Extended

By Andrew Vena

THAT PART of welding cable nearest the "business end"—the electrode holder—usually goes first due to the rubbing, scuffing, kinking, flexing, abrasion, burns, cuts, etc. acquired in normal use and abuse. To cut off the defective portion and move the holder back that much works all right, but makes the cable several precious feet shorter.

A better idea is to disconnect both ends and switch or turn the cable end-for-end BEFORE excessive wear at the working end has made shortening necessary. The "retired" end is now connected to the generator (or transformer) terminal. It may be protected from further wear by slipping a length of old rubber hose over it.

* * *

Turntable for Scrap Cutting

SLAG-ENCRUSTED skulls and other large steel and cast iron scrap members are reduced to charging box size by an efficient scrap-cutting installation designed by the Allegheny Ludlum Steel Corp., Brackenridge, Pa. Its unique feature is a turntable—just like a railroad locomotive turntable. The machine carriage rides on a track having one section that can be rotated horizontally to any desired angle.

This simple revision of a stationary cutting unit saves one or more moving operations. It is not necessary to position the scrap sections after each cut in order to reduce them further. Cuts can be made in any direction by simply revolving the table.

A swivel between the machine carriage and the horizontal support to which the torch is attached makes it possible to rotate the torch independently of the carriage or turntable. The heavy-duty cutting torch and a powder-cutting attachment are mounted on the rigid arm attached to the machine carriage. Steel sections up to five feet thick can be severed with this apparatus.

Hook up to A.O. Smith Experience

One of the world's foremost users of welding as a production tool wants to help you select the best *welder* for your specific job.

Impartial advice . . . because A. O. Smith builds and uses both A.C. and D.C. welding machines . . . is now yours for the asking whenever you plan to buy any welder.

Welding specialists will assist you in determining the type of welder . . . A.C. or D.C. . . . best suited to any given job.

This valuable service will help you to achieve quality and economy in production. Assistance in all technical phases of welding is offered. Your relationship with A. O. Smith can become a valuable asset.

Simply write, stating your requirements. Without obligating you in any way, prompt assistance will be provided.

A. O. Smith Corporation
Welding Products Division, Dept. 1A-252
Milwaukee 1, Wisconsin

International Division: P.O. Box 2023, Milwaukee 1, Wis., U.S.A.

78th ANNIVERSARY 1874 - 1952

A.O.Smith
WELDING PRODUCTS

Made by Welders . . . *for* Welders

Quick Repairs . . . with Bridgeport's No. 192 Low Fuming Bronze Rod

Braze-welding is probably the most economical method of making repairs because it saves time. Over-all heating and slow cooling are unnecessary. After proper cleaning and preparation, the break is heated to redness only. The free-flowing bronze rod has excellent "tinning" and "filling" characteristics. The resulting deposit has high tensile strength and shock resistance, yet is easily machined.

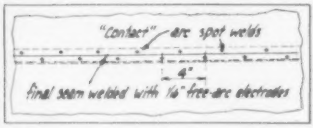
Every welder ought to know about this method of making quick, reliable repairs on cast iron and steel parts. There's a wealth of information on Bridgeport's No. 192 Low Fuming Bronze Rod and other alloys for every type of welding job in our free booklet "Bronze Welding Alloys." Send for your copy today.

"Bridgeport" BRASS CO.

BRIDGEPORT BRASS COMPANY
Bridgeport 2, Conn. Established 1865
Mills at Bridgeport, Conn., and Indianapolis, Ind.
In Canada: Noranda Copper and Brass Limited, Montreal

Bronze Welding Rod A PRODUCT OF
BRIDGEPORT BRASS

1—ROOF plates are strapped to the frame angles with long strips



2—ARC welds through the strips are made on each side of the seam

Spot Arc Welding

By A. H. Mulder

AN INTERESTING development from England is the use of contact electrodes for a process that may best be described as "spot arc welding." This was originated in the works of the Metropolitan Cammell Carriage and Wagon Co. Ltd., Saltley, Birmingham, a British firm that is renowned for the building of railroad carriages and other rolling stock.

The application is to fasten roof plates onto the main framework of railroad coaches. Previously, this job was done by either plug welding or by riveting. With either of these methods, numerous holes had to be drilled in the plates, and in the case of riveting holes had also to be drilled in the frames. Both methods meant that the plates had to be marked out, centered and drilled. Handling time was also a considerable item, as the final assembly is done in a different shop.

Now the 16-gage roof plates are strapped onto the 2 by 2 by ¼ in. frame angles with long strips, leaving space between the strips for welding (Sketch 1). Strips, plates and angles are clamped together at each end. The arc spot welds are made alternately on each side of the seam (Sketch 2) with contact electrodes. A ⅛-in. electrode is used with a current of approximately 170 amp.

After striking the arc, the electrode is held in a vertical position and pushed through the top plate. The welding technique is to puddle well into the frame angle and then withdraw the rod with a slow circular motion. This restores the surface of the plate and leaves a clean, flat circular weld.

A 1/16-in. "free-arc" electrode is used to weld the final seam between the abutting roof plates.

The spot arc process is also employed to weld floor sections onto the bottom frame angles.

This INVINCIBLE Flux Recovery Unit..
• SALVAGES VALUABLE WELDING FLUX
• SAVES COSTLY MAN-HOURS
• SPEEDS AND IMPROVES WELDING
Model 490, a compact unit designed for use with portable submerged arc welding equipment.

Our Invincible gives "very good results" is the report from The Rud Machine Co. of Cleveland. They use it extensively when repairing ships that carry freight over the Great Lakes. During winter months when the freighters are in port, Rud operates the unit almost every day.

On all sorts of submerged arc welding, hundreds of Invincible Flux Recovery Units are paying for themselves by:

1. SAVING VALUABLE FLUX—
Invincibles recover all loose flux from the work, remove slag or fused particles, and return the unfused flux to the hopper of the welder. These operations are performed in a continuous flow.

2. SAVING COSTLY MAN-HOURS—
Invincibles do the job *automatically*—far more rapidly and efficiently than manual methods.

3. SAVING EXPENSE OF REJECTS—
By removing all fine dust (flux flour), Invincibles reduce welding rejects and speed production.

These savings can be made on any job because there is a size and type of Invincible Flux Recovery Unit to meet every requirement.

FREE FOLDER

on Flux Recovery. Illustrated case histories show how Invincibles save money on all kinds of installations. Send for your copy NOW!

INVINCIBLE VACUUM CLEANER MFG. CO.
DOVER, OHIO
FOR 40 YEARS, LEADERS IN INDUSTRIAL VACUUM EQUIPMENT

an ACCO product for Stainless Steel WELDING

AC-DC Electrodes

GAS Welding Rods

made by

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BURNING...
stable even at lower heats

SLAG...
clean, easily removed

COATING...
resists cracking down to very short stubs

SELECTION...
complete line for welding every type of stainless

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PAGE Welding Electrodes AND Rods

IAA CONVENTION

(Continued from page 25)

Gas Supply Co., Ltd., Ottawa, Canada, acted as chairman. Mr. Pitts also contributed a detailed and scholarly talk on the history of acetylene from its initial discovery in 1836.

Other talks were given by Dean Byus, superintendent of the Pres-O-Lite factory, and Charles Ness, superintendent of the acetylene research laboratory. Mr. Byus told something of the early days when P. C. Avery, Carl Fisher and Jim Allison formed the predecessor of the Prest-O-Lite Company in 1904 for the manufacture of portable acetylene containers to produce lights for turn-of-the-century autos. Mr. Ness described the testing of acetylene cylinders by such methods as building a bonfire under them, deliberately creating a flashback, heating a spot in the cylinder wall to the molten stage with an oxy-acetylene torch and detonating a stick of dynamite at a previously weakened point. Another test method was abandoned because it was not drastic enough; this was to fire a 30-30 rifle bullet through the cylinder. A movie on the testing of cylinders by the bonfire method illustrated Mr. Ness' talk.

The afternoon tour included visits to the acetylene research laboratory as well as to the acetylene generating and charging plants. As a final treat, the visitors were taken for a ride around the 2½-mile oval of the world-famous Indianapolis Speedway. A race between buses added considerably to the excitement.

Business Meeting

Wednesday, the final day of the convention, was devoted to the annual business meeting and to a closed session for IAA members only. Reports of the secretary, treasurer and auditing committee were read, after which a number of resolutions were offered by J. J. Lincoln, Jr., Air Reduction Sales Co., as chairman of the resolutions committee.

One of these resolutions was to signify appreciation to the program, publicity and arrangements committee and particularly to Everett W. Axthelm, J. F. Callahan and members of the local committee: R. F. Flood, E. V. Fulkerson, W. L. Brant, W. C. Mullendore and C. H. Wilhelm. Another resolution expressed appreciа-

Price Cut $200 on Atomic-Hydrogen Welder

New G-E Welder is Ideal for Fabrication—or Repair of Costly Tools, Dies and Molds

You can now fabricate hard-to-weld metals and repair costly tools and dies quickly, easily and economically with the new G-E atomic-hydrogen welder!

Because this new equipment welds by means of fusion in an atmosphere of hydrogen, you get clean welds free from contamination, scale and spatter. You can easily deposit metal of practically the same analyses and heat-treating characteristics as the parent metal. This makes the atomic-hydrogen welder ideal for repairing dies, molds and high-grade machine tools.

You get clean, high-quality welds on stainless steel, nickel, molybdenum alloy steels and other hard-to-weld metals *without flux*, which makes the atomic-hydrogen welder an excellent tool for the production welding of such materials.

Features "Hot-start" and Silicone Insulation

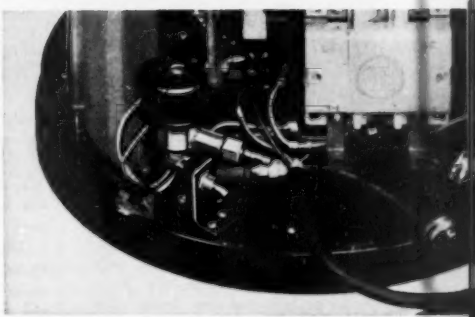
To give you quick, dependable arc-starting and maintenance-free operation, the new G-E atomic-hydrogen welder is equipped with automatic hot-start control and silicone insulation. You save on gas and power costs because this improved welder has automatic gas shut-off and power-factor capacitors.

This new welder will handle light-, medium-, and heavy-duty jobs because it has a wide current range from 10 to 100 amps. You can easily change from the high or low range by means of a switch.

See Your Authorized G-E Welding Distributor for all details on the new atomic-hydrogen welder. He also carries a complete line of AC, DC, and Inert-Arc welders, electrodes and accessories. You can find his name by looking for General Electric under "Welding Equipment" in the yellow pages of your telephone directory. Or write for bulletin GEC-598A to Section 711-23, *General Electric Company, Schenectady 5, N. Y.*

711-23

GENERAL ELECTRIC



YOU SAVE GAS because this solenoid valve on the atomic-hydrogen welder shuts gas off automatically

THIS $1600 DIE was saved from the scrap heap by a $40 repair job with a G-E atomic-hydrogen welder

$1718 Saved

. . . by "Bronze-Facing" large gear with wear-resistant Ampco-Trode 300*

HERE'S a large 10'6" diameter tube-mill gear with 120 teeth and an 11-inch face. A new one costs $2,148. This one was made better than new by "Bronze-Facing" it with wear-resistant Ampco-Trode 300 for only $530. Time required for the entire job — 82 hours.

You, too, can enjoy the savings in time and money made possible by "Bronze-Facing" with Ampco-Trode. Other advantages are: longer life and less down time. For instance, after 5 months' service in a cement mill, this gear showed little or no wear — thanks to the 300 Brinell tooth-surface hardness provided by Ampco-Trode 300.

In these days of shortages and long deliveries you'll find Ampco-Trode bronze electrodes a big help. Get a supply today from your Ampco distributor or write us.

W-113

AMPCO

Ampco Metal, Inc.
Milwaukee 46, Wisconsin

It's Production-Wise to Ampco-ize

*Reg. U. S. Pat. Off., Ampco Metal, Inc.

tion to the president of Linde Air Products Co. and to Dean Byus, Charles Ness and A. W. Pear, superintendent of the acetylene charging plant, for their parts in the previous day's entertainment.

Another resolution, likewise unanimously adopted, elected to honorary membership Curtis Welborn, president of Underwriters' Laboratories, Inc.

A silent rising vote was taken to mourn the deaths of six association members during the previous year: Philip Kearney, Henry W. Booth, Robert J. Kehl, Otis L. Smith, James A. Rafferty and Worthy Channing Bucknam.

New Officers and Directors

The report of the nominating committee was delivered by Robert B. Swope, president, Southern Oxygen Co., Inc., Washington, D. C. The following officers were selected for the 1952-53 term:

President: L. W. Hench, president of American Oxygen Service Corp., Harrison, N. J.

Vice-President: W. A. Brown, Jr., president, The Liquid Carbonic Corp., Chicago.

Treasurer: E. V. David, Air Reduction Sales Co., New York.

Secretary: H. F. Reinhard, Linde Air Products Co., New York.

Directors for three-year terms: Retiring President James W. Dunham, of National Cylinder Gas Co.; J. F. Wagner, vice-president, Burdett Oxygen Co., Cleveland; and J. Carl Bode, president, National Carbide Co.

There being no other nominations, these officers were duly elected. President Hench then took the chair for the duration of the meeting.

"I have a little butt welding job!"

NOW READY— NEW LITERATURE

Describing

Sight Feed

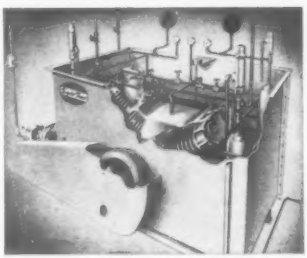
COMPLETE ACETYLENE COMPRESSING PLANTS

Featuring The

MODEL A-TWIN GENERATOR

and

MODEL M-1 COMPRESSOR



If you are planning an acetylene compressing plant installation, or enlarging present production facilities, write for catalog CP-152.

This new literature fully describes Sight Feed's Acetylene Compressing Plant Equipment. You'll read why the Model A-Twin Generator and M-1 Compressor are capable of producing larger quantities of acetylene in your plant at lower cost—and without the need for gas holders.

You'll be surprised how simply and economically Sight Feed Plants can be assembled and safely operated with a minimum of supervision and maintenance.

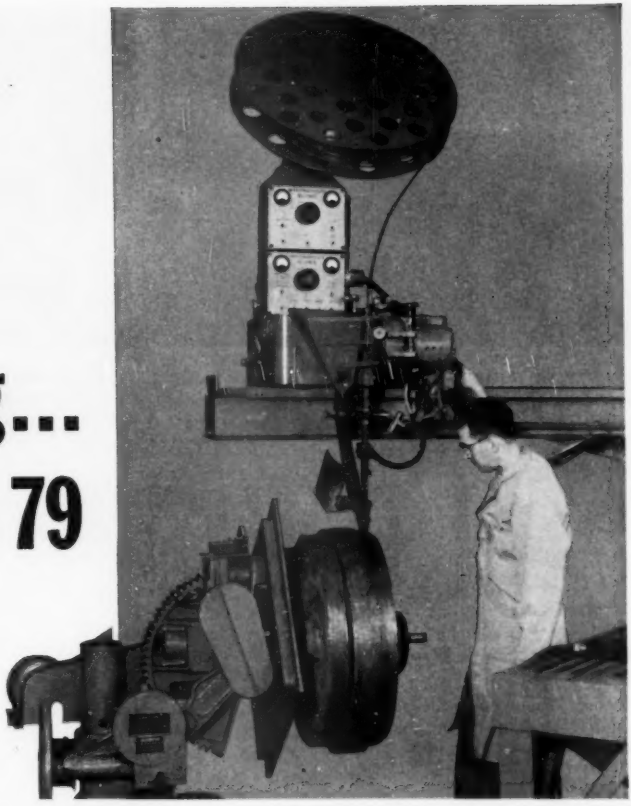
WRITE FOR YOUR COPY, TODAY!

THE SIGHT FEED GENERATOR COMPANY
West Alexandria, Ohio, U.S.A.

Manufacturers of Welding Equipment For More Than 25 Years

WELDING Sight Feed EQUIPMENT

Announcing... Amsco AW 79



for AUTOMATIC HARDFACING

AMSCO AW 79 will meet your every requirement for better control of wear where abrasion and high impact are important factors—plus giving you all the advantages of automatic welding. It can be used for reclaiming parts worn to uselessness or for increasing productivity of new parts.

The result of extensive research and field testing, AMSCO AW 79 is especially suitable for rebuilding and hardfacing tractor rollers and idlers. Back-up rolls, steel wheels, sheeting rolls, dredge pins, as well as dozens of other applications, can be successfully hardfaced with AW 79. It can be used on any conventional automatic submerged arc welding equipment now being used.

AW 79, the first in a series of rods by AMSCO for automatic hardfacing, is an alloy steel electrode fabricated by encasing particles of alloy metals in a continuous steel tube. Deposits are of martensitic alloy steel with chromium and molybdenum as the principal alloying agents. It is available in coils weighing approximately 100 lbs., each with an inside coil diameter of 22½", and is stocked in wire diameters of 5/32" and 3/16". Packed in cardboard containers with an anti-rust agent, other coil diameters and sizes are available on request. Write today for complete information.

AMERICAN Brake Shoe COMPANY

AMERICAN MANGANESE STEEL DIVISION

382 EAST 14th STREET • CHICAGO HEIGHTS, ILL.

Other Plants: New Castle, Del., Denver, Oakland, Calif., Los Angeles, St. Louis. In Canada: Joliette Steel Division, Joliette, Que.

Courtesy The Lincoln Electric Co.

POSTWAR BRIDGE at Cologne, Germany, uses welded design for 30% steel saving over destroyed bridge. Spans are a series of varied-depth steel box girders

Photo courtesy Laddie Ponich

STUDENT-BUILT replica of the famed all-aluminum bridge at Arvida, Ont., was displayed at Western Canada Welding Show held recently at Edmonton, Alberta

NEWS

Make A. O. Smith Welders in New Building

WELDER manufacture for the A. O. Smith Corporation was transferred from the main works to a separate 27,000 sq ft Milwaukee building in March. It provides more space for assembly lines where the 12 basic A. O. Smith welders are made. The building also houses experimental shops and some sales offices.

Space vacated at the Milwaukee Works will be utilized for expanded welding electrode production, which has been at peak capacity for the past year.

* * *

Australians Confident of Welded Ship Design

THE Australian Naval Board does not intend to alter or modify its plans for the construction of welded ships such as the *Daring* class destroyers. The Minister for the Navy, Mr. McMahon, pointed out on March 25 that the welded design, steels and welding procedure used to build new destroyers is based on many years satisfactory experience in naval usage.

Before adopting welded construction, the British Admiralty had conducted comprehensive tests of the materials that were to be used and the various techniques to be employed. The Australian Naval Board had the full benefit of these tests.

Mr. McMahon's comments were prompted by word from the United States that a congressional committee has been organized to investigate the recent breaking up of two tankers in Atlantic storms.

—*McGraw-Hill World News*

* * *

Welded German Bridge Saves 30% in Steel

THE postwar-built welded bridge across the Rhine river at Cologne, Germany, uses 30% less structural steel than the old bridge and has a greater capacity. It was designed by Dr. Ing. F. Leonhardt and is made up of a series of steel box girders, varied in depth to form shallow, parabolic curves.

Claimed to be the longest full web continuous girder bridge in the world, its spans measure 404, 605 and 707 ft, respectively. According to the transactions of the South African Institute of Civil Engineers, the roadway is 38 ft wide with two 10-ft sidewalks.

* * *

West Canada Weldors Hold Big Show

THE Second Annual Western Canadian Welding Show was held at Edmonton, Alberta, Feb. 27-29 before a large crowd of visitors from all over Canada. Staged in the Prince of Wales Armories it was put on by the Alberta Association of Certified Weldors.

Mayor Hawrelak of Edmonton gave the welcoming address the first evening of the show when the public was invited. He poitned out the importance of welding to the citizens of Edmonton and Alberta province.

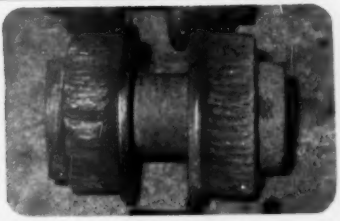
Strictly a welding show, the exhibition afforded many manufacturers a chance to acquaint a large audience with their products. Included among exhibitors were: Alberta Glove Co., The Alberta Oxygen and Acetylene Co., Ltd., D. Ackland & Sons, Canadian Liquid Air Co., Chicago Vocational Training Schools, Dominion Oxygen Co., Imperial Oil Co., Ltd., Alexander Latta, Inc., Luna Gas Ltd., Massey-Harris Co. Mechanics Supply Co., Motor Car Supply Co. of Canada, Ltd., Province of Alberta, Welding Branch, Standard Electric & Auto Parts, Taylor & Peerson, Ltd., Union Tractor and Equipment Co., Ltd., and Wilkinson Co., Ltd.

T. B. Jefferson, editor of THE WELDING ENGINEER, gave two speeches during the three-day affair. He talked on "Job Shop Economics" before the Western Canadian Welding Shop Owners. At the banquet and dance closing the show, Mr. Jefferson discussed the future of welding in America.

The Alberta Association of Certified Weldors was organized in 1947 and was the first in Canada. It was formed to promote better to educate the public on the wide potentialities of welded construction, to promote better understanding between employer and worker and to keep close contact with the provincial government on welding regulations. Mr. J. W. A. deBoer, chief instructor at Edmonton's Chicago Vocational Training School, is president of the association.

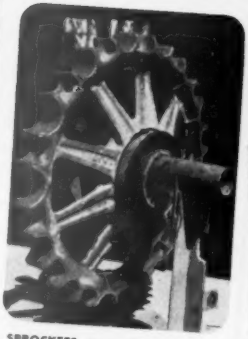
STOODY HARD-FACING

END BLADES on this bulldozer stay square, retain full blade load when protected with Stoody Self-Hardening 21. Note the cross pattern of stringers which packs a cushion of earth, saving hard-metal.

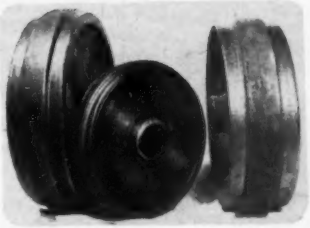


TOP CARRIER ROLLS keep spinning because Stoody 1027 keeps them round.

TRACK ROLLERS are ideal for automatic hard-facing. Stoody 105 doubles wear resistance, squares up cupped surfaces, reclaims rollers better than new.



SPROCKETS manually hard-faced with Stoody Self-Hardening or Stoody 1027 not only last longer but reduce bushing wear.



IDLERS are restored with Stoody 105, applied automatically, for 2 to 1 life increase. Note smoothness of deposit.

AUTOMATIC HARD-FACING

With Automatic Hard-Facing now available in nearby job shops, cost reaches a new low, quality is excellent. Ask for recommendations and list of local job shops—Your Stoody dealer, listed in the Telephone Directory "Yellow Pages", will help you—or write direct.

The DIE is CAST —to Size

...that's why AMPCO WELD* Resistance Welding Dies Save You Time and Money

Just think — when you order "cast-to-shape," "cast-to-size" AMPCO WELD dies, they come to you with tolerances of minus 0, +1/32" or plus 0, −1/32". There's no machining, no time loss. All you have to do is just put in the cap-screw holes — and brother, you're in production.

You also get longer runs and lower costs, because these dies are made of alloys with high physical properties that meet or exceed RWMA specifications. If you're interested in longer runs for your money, place your order now for AMPCO WELD "cast-to-size" dies.

. . . and Ampco Engineering Service when you need it

Behind the famous AMPCO WELD line of resistance-welding products is a corps of experienced engineers, ready to help you solve your problems. Prompt service from these men is yours whenever you need it. Just get in touch with us.

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AMPCO

It's Production-Wise to Ampco-ize!

*Reg. U. S. Pat. Off., Ampco Metal, Inc.

R. S. McCracken, Jr.

National NWSA Meeting At Chicago May 5-7

THE Eighth Annual Convention of the National Welding Supply Association takes place at the LaSalle Hotel in Chicago, Monday through Wednesday, May 5-7. A record attendance is expected, according to Robert C. Fernley, secretary-treasurer.

R. S. McCracken, Jr., of R. S. McCracken & Sons, Inc., Philadelphia, will be in charge of the convention in his post as national president. He will also preside at a meeting of the NWSA board of directors scheduled for 4 p.m. Sunday at the LaSalle.

Registration for the convention will be held from 3 to 9 p.m. on Sunday an from 9 to 10 a.m. both Monday and Tuesday. A general meeting for all delegates is set for 10 a.m. Monday in the Illinois Room. After lunch the famous NWSA "contact booth" program will be staged in the hotel's Grand Ballroom. Here, in a series of small, unornamented booths, manufacturers, distributors and visitors can meet to talk over mutual problems and say hello to friends.

Feature of Tuesday's general meeting will be a special panel on effective distributor - manufacturer relations. Manufacturer members for the panel will be E. L. Mills, The Bastian-Blessing Co., Chicago; Richard L. Sherwood, Hobart Brothers Co., Troy, O. and William H. Fellows, Bay State Abrasive Products Co., Chicago office. Distributors who have been asked to take part are Ralph E. Chase, Chase Welding Supply Co., Inc., Benton, Ill.; G. Milton Sims, Absco Welding Supplies, Los Angeles, and R. P. Tarbell, Scott-Tarbell, Inc., Cleveland.

Another chance to see friends and meet business associates will be given Tuesday afternoon in another contact booth period.

Low Temperature BRAZING will help you cut your metal JOINING COSTS

BRAZED AND SO TOUGH YOU CAN

BEND IT
TWIST IT
STAMP IT
DRAW IT
HAMMER IT
and it won't break or leak under pressure

Dependable United WIRE BRAZING ALLOYS

WIRE • ROD • RINGS • POWDER

Specify . . . for economy and better brazing

For the STEELS IRON NICKELS
SIL-BOND 45% Silver Alloy . . . excellent general purpose. Melts 1120°F brazes 1145°F. Use with Sil-FLUX. Tensile 70 000 p.s.i.

For the BRONZES BRASSES
PHOSON 6% Silver . . . Low cost . . . stronger than metals brazed. Melts 1185°F brazes 1380°F. Use with Sil-FLUX. Tensile 95 000 p.s.i.

For the COPPERS
PHOSCO No Silver . . . Very low cost . . . stronger than metals brazed. Melts 1308°F brazes 1495°F. Self-fluxing. Tensile 85 000 p.s.i.

For complete information ask your WELDING SUPPLY DISTRIBUTOR or our nearest office

OUR BULLETIN No. B-29-4 TELLS YOU HOW TO BRAZE THREADLESS FITTINGS TO TUBING

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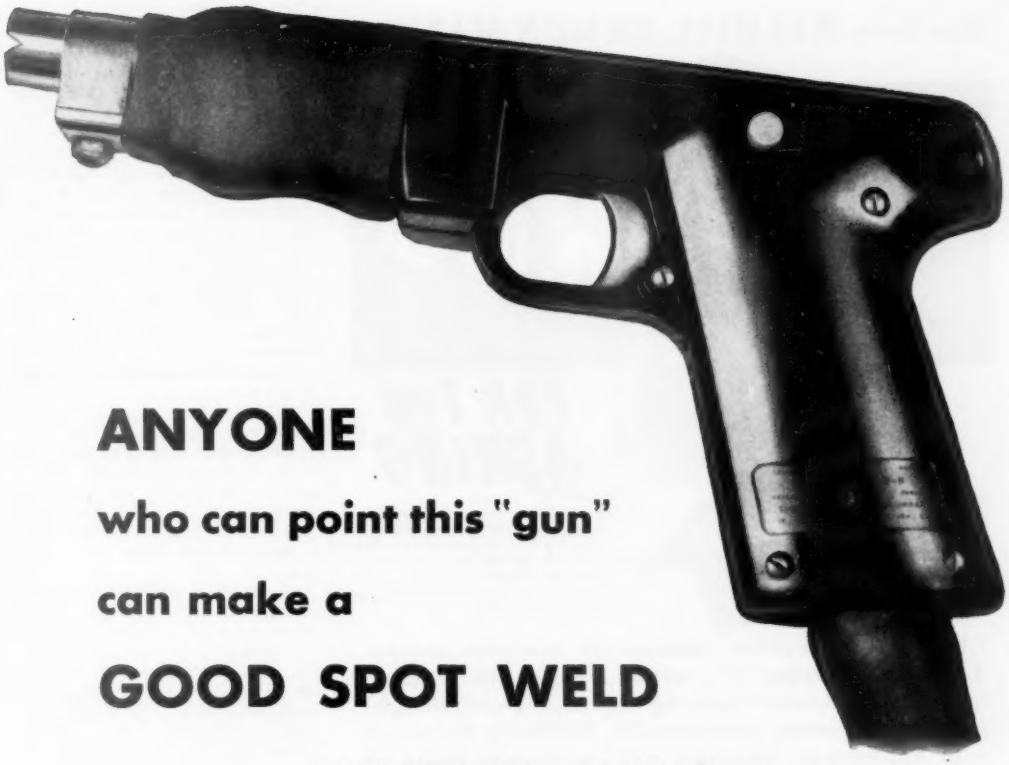

ANYONE

who can point this "gun"

can make a

GOOD SPOT WELD

"HELIARC" HW-8 Pistol-Grip Torch needs no forging pressure... works from one side of sheet... spot welds both STAINLESS and CARBON STEELS

Are you using light gage metals to fabricate large assemblies or irregular shapes? If so, chances are you can simplify many of your joining problems, boost production, and cut costs, too, by spot welding with the HELIARC HW-8 Torch.

The HW-8 joins mild steel, low alloy, or stainless steel .020 to .064 in. thick at one to two seconds per weld. Because it works *from one side of the sheet*, without forging pressure, it makes an easy, one-hand job of spot welding — even in places where resistance welding is not practical or possible.

Connected to a suitable power source with auxiliary timer, the HELIARC Spot Welding Torch makes inert gas shielded welds without fumes, smoke, or spatter. Since operation is automatically controlled, workmen on the assembly line need only press the "muzzle" of the "gun" against the work and pull the trigger. A single hose assembly permits free use of the torch over a 25-ft. radius.

For further information, telephone or write today. LINDE AIR PRODUCTS COMPANY, a Division of Union Carbide and Carbon Corporation, 30 East 42nd Street, New York 17, N. Y.

The term "Heliarc" is a registered trade-mark of Union Carbide and Carbon Corporation.

Linde Trade-Mark

Products and Processes for MAKING, CUTTING, JOINING, TREATING, and FORMING METALS

this new WELDING DESIGN MANUAL

FREE

FOR THE ASKING

72 PAGES
PROFUSELY ILLUSTRATED

Low Temperature EUTECTIC WELDING ALLOYS

To assist you in your re-tooling problems . . . or to help you analyze your present welding methods so that you may enjoy maximum speed, efficiency, and economy in many of YOUR production problems . . .

Giant new 4th Edition contains 62 new photographs, 132 new drawings, 72 pages of helpful data covering basic and advanced welding techniques and designs used in fabricating and assembly. Profusely illustrated with application drawings; weld diagrams; tables of melting temperatures, strengths, corrosion factors; charts; alloy recommendations; etc. Convenient digest size.

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SEE

. . . The unbelievable savings in metal-joining which can now be yours through the use of "Low Temperature Welding Alloys"® discovered a few years ago and now used in over 78,000 industrial plants throughout America for more efficient metal-working production as well as for salvaging irreplaceable tool and machine parts.

Over 100 different, new, EUTECTIC Low Temperature WELDING ALLOYS® and EUTECTOR® Fluxes are job-engineered for use on ALL metals – cast iron, alloy steels, aluminum, copper and nickel alloys, die castings, overlays, etc., and may be applied with ALL heating methods – torch, arc, furnace, induction heating, etc.

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Spot Welding Meeting Attracts 118 Experts

LEADING authorities on the spot welding of aluminum attended an American Welding Society symposium March 11 and 12 at the Knickerbocker Hotel in Chicago. Purpose of the symposium was to talk about recommended practices for fabricating aluminum by spot welding.

More than 118 engineers and production men from all over the country attended the all-day sessions. They represented such industries as aircraft, furniture, fuel tanks, containers, refrigerators, electrical parts, telephone equipment, stoves, radio, railroad car builders, car heaters, automotive accessories and custom body builders.

All discussion on such subjects as welding force, welding time, electrodes, defects, weld examination and welding schedules was recorded for use in following up the knowledge brought out by delegates. This record will be incorporated into the AWS recommendations when they are issued.

In charge of arrangements for the meeting was Si Greenberg, technical secretary of AWS. Assisting him was Julius Heuschkel, Westinghouse Electric Corp., head of the AWS committee on resistance welding. Prominent members of panels and discussion leaders included Fritz Albrecht, Glenn L. Martin Co.; I. W. Johnson, General Electric Co., J. J. MacKinney, The Budd Co. and Floyd Matthews, Boeing Airplane Co.

• • •

British Publish Pipe Welding Standards

THE British Standards Institution has recently published the first of a series on the oxyacetylene welding of piping in high-temperature, high-pressure service. Conditions referred to in the standards are those where the pressure exceeds 250 psi and the temperature 425 F.

The standard sets the conditions for shop and field welding of joints in steel pipelines up to and including 20 in. diameter. The first part defines the parent metals and specifies the types of filler rods, welding technique, general precautions and qualifying test for weldors. Part two deals with butt joints and specifies the method of joint preparation and requirements for the completed welds. Other parts cover such subjects as flanges and bends, branches, sleeves and other connections. Copies can be obtained from the British Standards Institution, 24 Victoria St., London, S. W. 1. for a price of six shillings.

—McGraw-Hill World News

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Order these quality lenses direct!

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TRADE MARK

INDUSTRIAL LENSES

Cut your costs by ordering these quality lenses *direct* from one of America's most experienced lens makers. Penoptic* Industrial Lenses exceed all Federal Specifications. You can depend on their quality . . . and *save!*

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PENOPTIC* SAFETY LENSES

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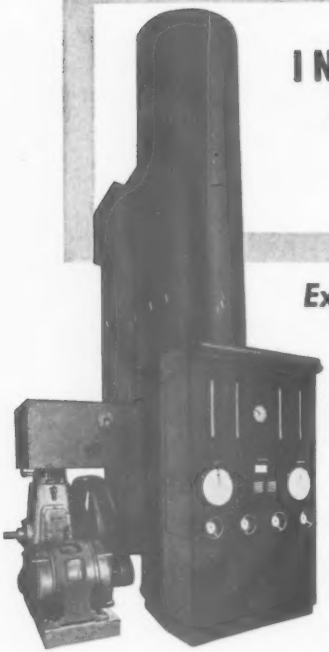
PENNSYLVANIA OPTICAL COMPANY

READING, PA.

Known for Fine Ophthalmic Products Since 1886

*PENOPTIC *is the trade name of Pennsylvania Optical Company.*



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Expansion Engine Type
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OXYGEN
AND
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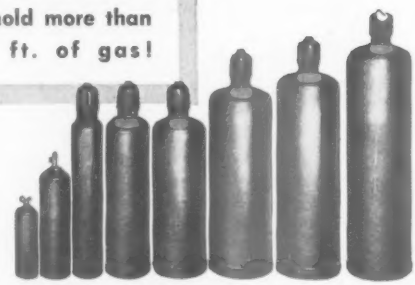
Producing Plants

Built in standard sizes—15 meters or 530 cu. ft to 283 meters or 10,000 cu. ft.—in single and double rectification units. If you need them, larger sizes are available.

If the more than one quarter of a million INDEPENDENT CYLINDERS we have built were filled at one time, they would hold more than 50,000,000 cu. ft. of gas!

Furthermore, Independent Acetylene Cylinders hold from 5 to 10% more gas, and the uniformity of the monolithic filler insures even distribution of acetone. Oxygen Storage cylinders available in 12' and 20' lengths; capacities 850 and 1500 cu. ft.



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Manufacturers of
CONSULTING RESEARCH DESIGNING
CYLINDERS AND GAS PRODUCING EQUIPMENT
ACETYLENE · OXYGEN · HYDROGEN · NITROGEN
O'FALLON 5, ILLINOIS

Cleveland Welding Firm Grows on Ship Jobs

ONLY 15 months old, The Tower Welding Company, Cleveland, is doing a flourishing business welding hatches and tanks for lakes vessels, structurals for other ships and installing radar and radio equipment on craft of various types. Tower started out with 20 employees and now has 160 men on its payroll.

The company started as a marine repair unit of Midland Steamship Line, Inc. and is a wholly owned subsidiary. Last summer the company prefabricated 32 hatches for the steamer *John C. Williams*, and installed them this winter in just nine days. This spring Tower's jobs have included building and installation of new tank tops and side tanks in steamers as well as after pent-houses for the convenience of ships' engineers. Also equipped to do marine electrical contracting, Tower installed radar sets on each of Midland's six vessels.

Equipment used by Tower includes 440-volt welders, air compressors, auxiliary generators, a portable fork-lift, a converted landing craft with provisions for mounting six welders and three repair scows.

Officers are Michael K. Tewksbury, president, John M. Munn, vice-president and general manager; Charles G. Walker, jr, financial vice-president and Richard P. Eide, secretary.

* * *

New Ampco Distributor

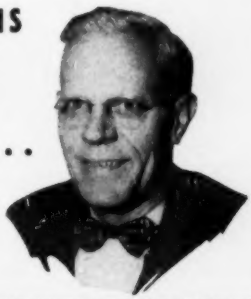
KIRK-Wicklund and Company, Kansas City, Mo., has been appointed a franchised distributor of Ampco Weldrod products for the northern and eastern counties of Kansas. They will handle the complete line of welding products, including electrodes, bare wire and filler rods.

"I picked it up at a cute little hat shop!"

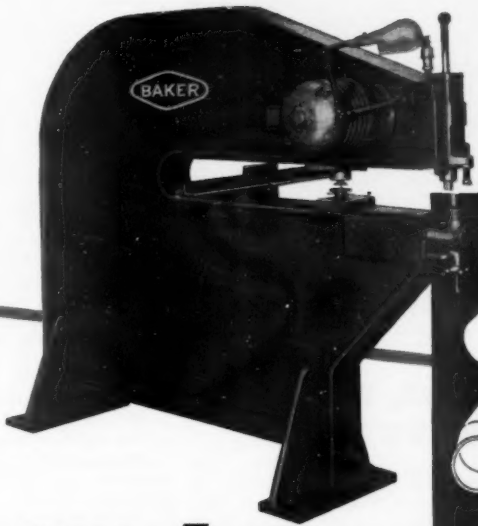
"FOR MANY CUTTING OPERATIONS

THE BAKER SHEAR

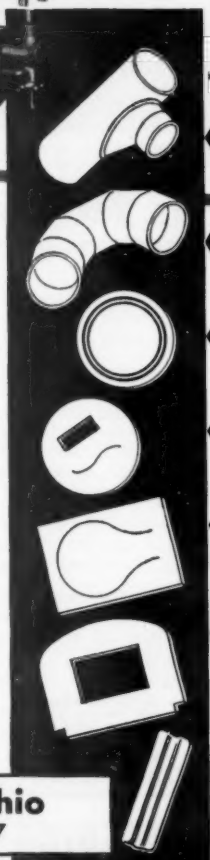
MULTIPLIES OUR PRODUCTION RATE"...



Says Mr. Arthur Christen, Vice-President of The Fred Christen & Sons Company, Toledo, Ohio



DOES ALL THESE JOBS



Quantity 2, no template required.

Quantity 85, save time with template—no layout required.

Beading operation, entirely within sheet—compare with other methods.

Inside cuts, no starting hole required.

Inside cut, no metal removed—parts will mate when finished.

This job was cut in 22% of time of previous method.

Custom or low-quantity beading done with low tool cost.

SAVE TIME 5 WAYS!

Do your heavy duty cutting *faster and better* with the Baker Tru-Edge Contour Shear! It reduces operating time to less than ¼ of the time required on previous machines—as shown by actual cases on record because:

★ FAST CUTTING . . . 10 to 36 ft. per minute.
★ BURR FREE EDGE . . . No finishing required.
★ NO TEMPLATE NEEDED.
★ NO STARTING HOLE for inside cuts.
★ Cuts various thicknesses without adjusting machine.

Capacity: 6 gauge in mild steel, 7 gauge in stainless steel. Simple in design, only 5 moving parts. Versatile—does many jobs with speed and accuracy. Saves labor. Baker-built dependability.

WRITE . . . for illustrated bulletin and price

BAKER BROS., Inc., Toledo, Ohio
Makers of Better Machine Tools . . . Since 1867

The Tru-Edge Contour Shear is made by Baker Bros., Inc., under license from Industrial Devices Corp., Detroit, Mich.

NELWELD CASE HISTORY IN HEAVY EQUIPMENT

Nelweld operator welding 7/8" dia. studs at a rate of 4 or 5 per minute on a mounting flange of a coal pulverizer casing. Photo courtesy of Combustion Engineering-Superheater, Inc.

HOW TO SAVE 7 HOURS, 7 MINUTES IN AN EIGHT-HOUR DAY!

THE PROBLEM — How to cut down production time necessary for the installation of ninety-six 7/8" dia. studs on the mounting flanges of a large, heavy casing—requiring considerable labor and equipment time for handling, drilling, and tapping.

THE NELWELD ANSWER—One workman, using the light-weight Nelweld gun and Nelson granular flux-filled studs, end welds each stud in less than 20 seconds—*at least ten times faster than former methods!* He simply inserts the stud in the chuck, locates it on the work, and presses the trigger—Nelweld does the rest and the stud is set! *By time study comparison, the Nelweld Method did the same job formerly requiring eight hours in less than 54 minutes!*

THE RESULT—One man, working in one spot with a portable Nelweld unit, has released the equipment and manpower formerly required for the handling of ninety-six separate drilling, tapping and setting operations.

Change-over to the Nelweld method required only a minor investment, with immediate results in decreased production and fabricating costs. These same outstanding Nelweld advantages can prove valuable in your fabrication of equipment.

For complete information on the advantages of Nelweld as applied to your fastening techniques, contact the nearest Nelson office or write Department W-3, Lorain, Ohio.

Fasten it Better...at Less Cost, with NELWELD T. M. REG.

NELSON STUD WELDING

DIVISION OF GREGORY INDUSTRIES, INC., LORAIN, OHIO

Mobile Carriage Aids Inert-Gas Spot Welding

PLANT engineers at The Ryan Aeronautic Company, San Diego, Calif., have mounted inert-arc-shielded spot welding equipment on a three-wheeled truck to move it quickly along the production line.

The easy availability of the truck exploits fully the outstanding advantage of inert-arc spot welding—making quality spot welds on aluminum parts that are accessible from only one side. Intricate jigs holding aircraft components can either be assembled for quick welding by this process or can be visited in turn by the new truck.

Ray Ortiz, manifold production superintendent at Ryan, suggested the new mounting. It provides a timing control, d-c welding generator, argon gas supply and a 40-gallon water tank and pump for the equipment which was made by Linde Air Products Co.

Operation of the welding gun is completely automatic after the operator presses the trigger on the pistol-grip welding gun. First, argon gas flows through the cable to the gun and out the barrel to blanket the weld zone with a protective envelope. Then, a d-c current with a superimposed high-frequency a-c current, is fed to the gun's single tungsten electrode. An arc is struck and maintained for a predetermined time during which the two layers of aluminum melt and flow together. After the welding arc is extinguished, the argon gas flows for several seconds to protect the weld and the tungsten electrode from oxidation while they're still hot.

Ryan uses the welding truck to spot weld "Flying Boxcar" exhaust hoods as well as machined rings in assembly jigs prior to seam welding. The stainless rings go into Wright 3,500 hp engines where they are fitted to the turbine nozzle boxes.

* * *

Sylvania Expands Electronics Division

INCREASING demands for electronic tubes from industrial users and the armed forces will be met by new expansion of the electronics division of Sylvania Electric Products Inc. A new 100,000 sq ft building at Woburn, Mass., will provide air-conditioned laboratory and production space for making electronics products. In addition, another building has been purchased in Newton, Mass., to be tooled up for magnetron and klystron tube production. Since 1945, Sylvania electronics products have been made at its 85,000 sq ft plant in Boston. All three plants will continue production at high levels.

REBUILD YOUR WORN EQUIPMENT with
VICTOR HARD-FACING ALLOYS

	FOR THESE CONDITIONS	FOR SUCH EQUIPMENT
VICTORALLOY	Abrasion and severe impact	Tractor rollers, dredge pump impellers, bucket lips and teeth, rock crushers, steel mill wobblers
VICTORTUBE	Severe abrasion	Scarifier teeth, dredge cutter blades, posthole augers, oil field tools, ditcher teeth
VICTORITE	Earth abrasion or sliding friction	Plowshares, cultivators, steel mill guides, cement chutes, shaft bearings, rolling mill guides
VICTOR 1	Corrosion, heat and abrasion	Saw-teeth, carbon scrapers, wire guides, rocker arms
VICTOR 6	Red heat, impact, corrosion and abrasion	Blanking, forming and trimming dies; cams, hot punches, pump shafts
VICTOR TUNGSMOOTH	Thin cutting edges	Coal cutter bits, brick augers, pug-mill knives, screw conveyors

Made for both acetylene and electric AC and DC application. Get your supply from your VICTOR dealer NOW.

VICTOR
WELDING AND CUTTING EQUIPMENT

Write today for helpful folder, showing where and how to use VICTOR hard-surfacing rods.

VICTOR EQUIPMENT COMPANY
ALLOY ROD AND METAL DIVISION

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New WELDING IMPROVEMENT ASSURES

GREATER CONTROL OVER WELD POWER

WITH

HI-CONDUCTIVITY
LO CONDUCTIVITY

Robotron "CUSHIONED POWER" WELDING TIMERS

THE PROBLEM: To help manufacturers meet more and more exacting specifications issued by government and civilian buyers in the welding of Aluminum, Stainless and Nickel-Alloy Steels, Coated or Plated Metals, or any combination of Dissimilar Metals regardless of conductivity.

To design new, compact electronic controls that can be added to your old or new welding equipment with ease.

To increase welding production at lower cost.

Robotron's ANSWER: A new concept of Vernier Control, the Robotron "Cushioned-Power" Welding Timer pre-heats and prepares the welding material, welds and tempers according to specific needs, assuring welds of minimum surface indentation, maximum ductility and consistant uniformity.

- It welds all combinations of Hard-to-Weld, Plated or Dissimilar Metals.
- Reduces Weld Power KVA (heat) demand and usual required Electrode Pressures.
- Reduces Metal Spewing, Cracking and Surface Indentation.
- Reduces Electrode Pickup and Cleaning Time.
- Cushions impact on Welding Lines — Adds life to Electrodes.
- Can be Added to your present Welding Equipment.
- Can be used in Single-Phase Welding.
- Reduces overall Welding Costs.

Factory time-tested and proven like all other Robotron Electronic Control Equipment, this new "Cushioned-Power" Welding Timer features Compactness, Maximum Accessibility, Easy Installation, Easy Maintenance and Finger-Tip Modulated Power Control. Investigate how Robotron "Cushioned-Power" Welding Timers can increase YOUR welding production — No Obligation, of course.

MODEL W630—H3C4
NEMA 7B Sequence — 1A Synchronous Timer with "Cushioned-Power" Control and 600 Ampere Ignitron Contactor.

WRITE OR WIRE TODAY FOR FREE LITERATURE—ESTIMATES

THE FINEST IN INDUSTRIAL ELECTRONICS

Robotron* CORP.

21300 W. Eight Mile Rd., Detroit 19, Mich.

3497 *T. M. Registered

Cutting Electrode Helps in Tractor Repair

SAVINGS of $1,305 and 12 days of down time have been reported by a San Jose, Calif., contractor who credits a new cutting electrode for speeding repairs on a crawler tractor. Two San Jose men did the quick thinking and skillful welding that put the tractor back on the job.

Frank Booth, a weldor at Materials Equipment & Supply Co., San Jose, and Jack Garrels, manager of welding at Pacific Hardware & Steel Co. worked on the tractor a total of only 64 hours. They were called in because a broken cap-screw had fallen inside the crawler's final drive housing and badly cracked it in several places.

The cracks were prepared for braze-welding by chamfering the edges with a new cutting electrode that does not require oxygen or air. One tank each of oxygen and acetylene was consumed for the braze-welding. Total cost of the welded repair, including labor at $2.29 per hour was $180.88, according to word received at All-State Welding Alloys Co., Inc., White Plains, N. Y.

Cost of a new drive housing would have been $900 with another $586 added for 256 man-hours of disassembly and assembly time.

* * *

Big Gamma-Ray Source for Stanford Institute

THE largest source of radioactivity outside of Atomic Energy Commission installations will be available for research late this spring at Stanford Research Institute, Stanford, Calif. A 5,000 curie source of Cobalt-60 will go to Stanford's new Radiation Engineering Laboratory from the Brookhaven National Laboratory.

By curie measurement, emissions from this powerful source are so penetrating that they could be partly duplicated only by $100,000,000 worth of radium.

Stanford's new laboratory will develop and engineer practical and safe systems for the use of large amounts of radiation in a variety of possible industrial applications. Some promising uses to be investigated include non-destructive testing of large metal weldments and castings and the cold sterilization of heat-sensitive foods and antibiotic drugs.

* * *

To obtain additional information on any advertised products, use the cards on pages 17-18.

ASTE Chicago Show Outstanding Success

ATTENDANCE figures at the Tool Show in Chicago March 17-21 showed that 100,000 people were admitted and 38,110 representatives from industry registered. Sponsored by the American Society of Tool Engineers, the show featured the products of more than 44 exhibitors.

Exhibition space was at such a premium in the huge International Amphitheatre that more than 60 companies' requests for booths were turned down. Two companies assembled displays of their products in buses parked across the street from the hall.

A $500,000 fire broke out in the "precision control" hall on the second day of the show. Although 14 exhibits were destroyed in the fire and many others damaged, the entire hall was back in operation by opening time the next day. New booths were made, new signs painted and plumbing and lighting returned to order. Some exhibitors secured new equipment from their factories that night and others had it flown in by air express on Wednesday. No exhibitor dropped out of the show.

Welding equipment manufacturers occupied a sizeable part of the space in the exhibition halls.

* * *

Welded Digesters Turn Cotton Seed into Rayon

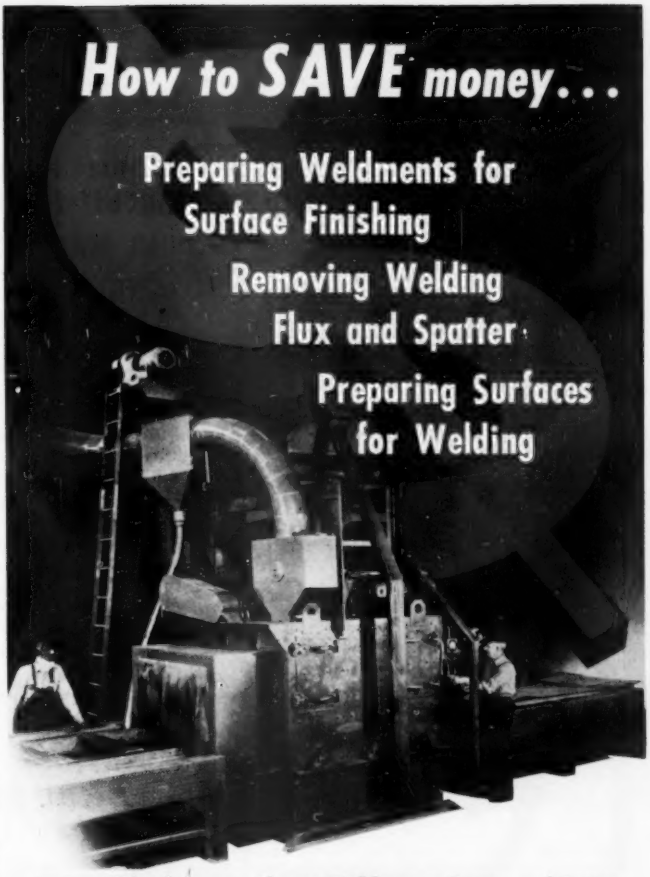
LARGE all-welded steel digesters, similar to those used in paper mills, are now used to turn cotton seed linters into pulp for rayon and plastics. Six of the vessels have been built by the Babcock & Wilcox Co. for the Memphis, Tenn., plant of the Buckeye Cotton Oil Co., a subsidiary of Procter and Gamble.

The digesters are 32½ ft long and have an inside diameter of 11 ft. They operate at a pressure of 165 psi at temperatures up to 350 F. Total weight of each vessel plus contents is 100 tons, which is supported on two trunnions that rest in heavy water-cooled bearings. The trunnions are 16 in. in diameter and made of forged steel welded into a heavy center reinforcing section.

All equipment was fabricated at the Barberton, O., plant of Babcock & Wilcox and conforms with ASME code requirements for unfired pressure vessels, including radiographing of welds and stress relieving.

* * *

To obtain additional information on any advertised products, use the cards on pages 17-18.


How to SAVE money...
Preparing Weldments for Surface Finishing
Removing Welding Flux and Spatter
Preparing Surfaces for Welding

Airless Wheelabrator Cleans Weldments Faster and Better

Welded assemblies are cleaned mechanically at high speed with the airless Wheelabrator eliminating costly, time-consuming wire brushing, grinding and chiseling. Because of the thoroughness of Wheelabrator cleaning, welds adhere more tenaciously and final finishes are anchored in a permanent bond.

Time and cost-savings effected are usually sufficient to amortize the entire investment in from 6 to 18 months. For example, a 35% saving in cleaning weldments for automotive service equipment resulted from an installation at the Weaver Mfg. Co., Springfield, Ill.

A complete line of Wheelabrators is available for cleaning all sizes and shapes of weldments. They will produce the surface cleanliness you desire at an unusually low cost.

GET THE FACTS TODAY. **Write for Bulletin No. 784**

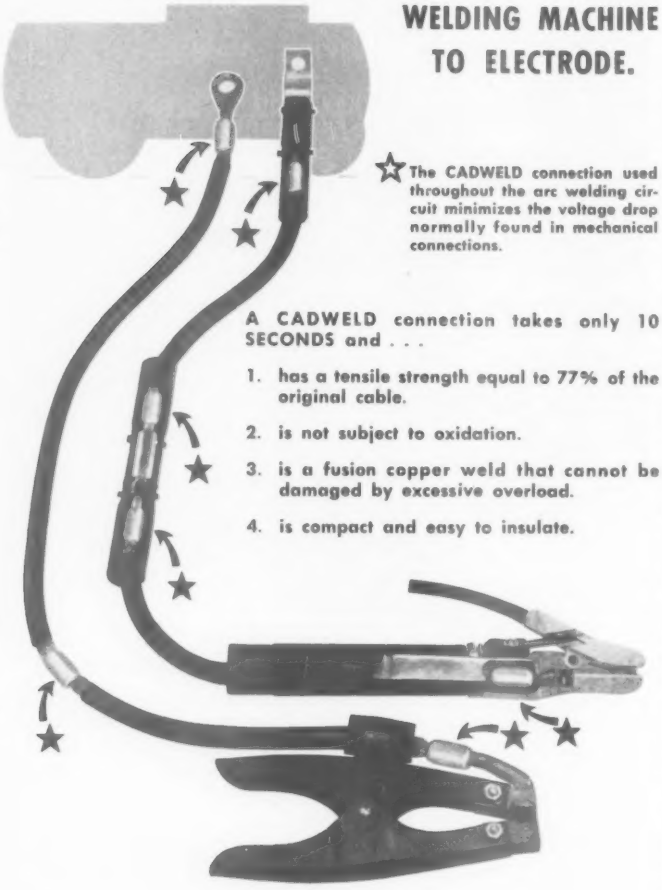
American Wheelabrator® AIRLESS BLAST CLEANING

WHEELABRATOR & EQUIPMENT CORP.

857 S. Byrkit St., Mishawaka, Ind.

AROUND THE WELDING CIRCUIT WITH CADDY
LUGS • QUICK CONNECTORS • ELECTRODE HOLDERS • SPLICES • GROUND CLAMPS

"CADDY" ARC WELDING ACCESSORIES NOW GIVE YOU A SOLID COPPER CIRCUIT FROM WELDING MACHINE TO ELECTRODE.



☆ The CADWELD connection used throughout the arc welding circuit minimizes the voltage drop normally found in mechanical connections.

A CADWELD connection takes only 10 SECONDS and . . .

1. has a tensile strength equal to 77% of the original cable.
2. is not subject to oxidation.
3. is a fusion copper weld that cannot be damaged by excessive overload.
4. is compact and easy to insulate.

Included in the finest engineered line of arc welding accessories on the market today is the "CADDY" Type B 500 amp. fully insulated electrode holder using Plaskon's reinforced ALKYD insulators.

CATALOG ON REQUEST

"CADDY" ARC WELDING ACCESSORY DIVISION
ERICO PRODUCTS, INC. • 2070 E. 61st PLACE • CLEVELAND 3, OHIO

25-Year-Old Barges Replated by Welding

AN extensive program of welding new side and bottom plates on 25-year-old river deck barges is being carried out by the Corps of Engineers at the Dravo Corporation's Neville Island shipyard, near Pittsburgh. Increasing barge costs and scarcity of structural steel prompted the idea of rebuilding the oldsters.

The barges being replated are old riveted barges, operating since the early 1920's. Though their interior framing was in excellent condition, because of a good protective coating and regular removal of bilge water, the decks, sides and bottoms were indented and in some plates dangerously pitted.

Rebuilding of the first ten vessels in the program began in April, 1950. Since that time, Dravo has been awarded a new contract for 20 additional replating jobs on sister barges operated by the Memphis district of the Corps of Engineers.

First step in the rejuvenating process is the removal of the banged-up plates by manual flame-cutting. Damaged side frames and other structurals are also removed and inspected at this time. Next, large areas of side plating, bottom plating or entire barge sections are prefabricated in the shops at the shipyard. Heavier plates are used, if possible, than those originally installed. By efficient use of prefabrication much time is saved in fitting, tack welding and position welding new sections on the boats.

To make over the damaged decks, a mastic compound is poured on like concrete and positioned by special forms. It not only covers the indented and uneven old plates but makes a tough, weatherproof working surface. After a thorough sandblasting and a finish coat of paint, the barges go back on the river and are good for another 20 or 25 years' hard use.

• • •

G-E Reduces Prices on Atomic Hydrogen Welders

A LIST price reduction of $200 on atomic hydrogen welders has been announced by the welding department of the General Electric Co. Raymond C. Freeman, manager of the department, said that the redesigned 60-cycle, single phase atomic hydrogen welder uses less copper because of the extensive use of silicones. The newer model uses the same base, cover and case as G-E's standard a-c transformer welder. The welder is rated at 75 amp and stands 41½ in. high, has a diameter of 18¾ in. and weighs 350 lb.

BETTER BRAZING —for Less!

with Westinghouse Phos-Copper and Phos-Silver

Are you still using costly silver solders to braze copper, brass or bronze? The time-tested Phos-Copper and the sensational new Phos-Silver will braze these metals at a fraction of the cost of silver solder and do the job *better* and *faster* with these advantages:

No Flux: On copper-to-copper joints, a flux is not required when using Phos-Copper or Phos-Silver.

Low Temperatures: Phos-Copper permits brazing temperature as low as 1350° F. Where even lower temperatures are required, Phos-Silver may be used as low as 1225° F.

Perfect Bonds: The high fluidity and excellent wetting properties of Phos-Copper and Phos-Silver assure strong, ductile bonds capable of withstanding repeated shock and vibration.

For further information call your nearest Westinghouse office or write Westinghouse Electric Corporation, Welding Division, Buffalo, N. Y. Ask for Brazing Booklet B-5454.

J-21688

YOU CAN BE SURE...IF IT'S
Westinghouse
WELDING EQUIPMENT

T-W HAS the DOPE on ORDNANCE

This double roll Seam Welder welds Base Plates to Projectiles. With slight modification, the welder can weld base plates to six sizes of projectiles from 75 MM to 8".

● Save days of engineering and planning—the information you need is in the T-W files. Bring your contract problems to T-W—take advantage of previous experience and collected data. T-W men can help you with your bid; show you how to approach the job; how to install the equipment and how to produce the parts. The listing at right shows a few of the items which T-W customers are producing on T-W welders. Call on Taylor-Winfield and the men who know from experience how to handle specifications covering ordnance items.

Write, wire or phone Taylor-Winfield.

A Few of the Products Made on T-W Welders

BASE PLATES ON PROJECTILES

AMMUNITION BOXES

BAZOOKA FIN ASSEMBLIES

60 AND 81 MM TRENCH MORTAR FIN ASSEMBLIES

SHELL CONTAINERS

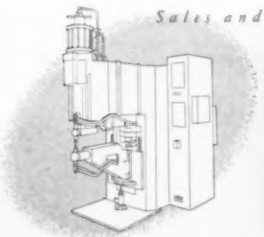
PRACTICE AND LIVE AERIAL BOMB FIN ASSEMBLIES

GRENADES, GRENADE LAUNCHERS

ARMOR PIERCING SHELL ASSEMBLIES

COMBAT HELMETS

BAZOOKA COMPONENTS



Sales and Service In All Principal Cities

TAYLOR-WINFIELD
RESISTANCE WELDERS

Resistance Welders Since 1883

THE TAYLOR-WINFIELD COMPANY ● WARREN, OHIO

3,000 Welding Men Attend Pittsburgh Clinic

VISITORS from all over western Pennsylvania registered at the Welding Clinic held April 2-4 by Williams & Co., Pittsburgh welding distributors. Total registration was 2,600 with estimated final attendance figures going over the 3,000 mark.

More than 20 leading welding manufacturers had exhibits set up and gave live demonstrations of many types of welding equipment. Such demonstrations not only instruct the hundreds of visitors to such shows, says R. C. Waldie of Williams & Co., but help welding salesmen keep up with the latest developments. In a sense, factory training is brought right to the distributor's shop for first-hand instruction of the whole operating force.

Each booth at the Williams clinic kept a record book of interested prospects for their sales forces to follow up later. Every Williams employee worked in or attended at least three booths per day so that he could get help from factory specialists as well as do live-demonstration welding or brazing.

According to Mr. Waldie, Williams & Co. always makes it a point to talk up the clinic for at least two months in advance. Customers and prospects are made to feel they're being asked to an important affair that will provide real help on manufacturing problems.

Companies in attendance included The International Nickel Co., Inc.; Aluminum Co. of America, Handy & Harman and Linde Air Products Co., among some 16 others.

* * *

One of the striking differences between a cat and a lie is that a cat has only nine lives.—Mark Twain

"Joe gets some of the prettiest arcs don't you think?"

You can be sure of efficient cooling action with MALLORY leak-proof KO Holders

RESISTANCE WELDING "TEAMWORK" THAT SAVES YOU TIME AND MONEY

When you decide on Mallory holders you have a large, standardized variety to choose from—all designed to give top welding performance at lowest possible cost.

And when you team these holders with the wide range of Mallory electrodes, you get an almost infinite variety of combinations which cover 'most any welding job you want done—thus saving the time and cost of special designs.

You can count on Mallory for outstanding, low-cost welding performance and engineering service whenever you need . . .

Electrodes	Holders
Dies	Rods & Bars
Castings	Forgings

And that means Mallory KO holders give you outstanding resistance welding performance PLUS . . .

- **More effective cooling**
- **Longer electrode life**
- **Easier operation**
- **Positive tip ejection**

Here are the exclusive Mallory features that mean low-cost, trouble-free welding for you . . .

- **O-Ring seal construction to prevent leaks**
- **Alloy, brass and stainless steel construction to prevent corrosion**
- **Special design to permit maximum cooling action**

From any standpoint—cost, performance, service—you'll find it pays to use Mallory KO holders always. Get details today from your distributor.

In Canada, made and sold by Johnson Matthey and Mallory, Ltd. 110 Industry St., Toronto 15, Ontario

P. R. MALLORY & CO. Inc.

MALLORY

SERVING INDUSTRY WITH

Electromechanical Products—Resistors • Switches • TV Tuners • Vibrators
Electrochemical Products—Capacitors • Rectifiers • Mercury Dry Batteries
Metallurgical Products—Contacts • Special Metals • Welding Materials

P. R. MALLORY & CO., INC., INDIANAPOLIS 6, INDIANA

For information on Titanium Developments contact Mallory-Sharon Titanium Corp., Niles, Ohio.

EASY-FLO AND SIL-FOS MAP OF THE U.S.

Every dot's a Dealer—ready **to give you on-the-dot service**

Wherever you are there's an EASY-FLO and SIL-FOS dealer handy—all set to supply you promptly with these celebrated low-temperature silver brazing alloys—and to help you get the full benefit of their remarkable speed, strength and economy in joining metals. He places at your call any and all of the services listed at the right—*all without obligation.*

WRITE TODAY

for our Dealer list and a copy of the 24-page

BULLETIN 20

which gives the whole amazing story of fast, low-cost EASY-FLO and SIL-FOS brazing.

- **DEMONSTRATIONS** *of EASY-FLO and SIL-FOS brazing in your own shop.*
- **SURVEYS** *of your metal joining to determine if, where and how low-temperature silver alloy brazing can benefit you.*
- **SAMPLE BRAZING** *of your specific parts to determine the best way to braze them.*
- **PRODUCTION AID** *to help work out the procedure that will give you the brazing output you want at lowest cost.*
- **EMPLOYEE TRAINING** *of your key men in Handy & Harman's brazing schools or by a program we help you set up in your own plant.*
- **RESEARCH** *in Handy & Harman's laboratories for working out your special silver alloy brazing problems.*
- **TECHNICAL BULLETINS** *giving you the technical facts and data on silver alloy brazing as uncovered in our research work.*

HANDY & HARMAN

General Offices: 82 Fulton St., New York 38, N.Y.

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DETROIT, MICH.
LOS ANGELES, CAL.
TORONTO, CANADA

TWIN BLENDER readies chloromycetin wonder drug for capsuling

Stainless Kettles Make New Wonder Drug

ONLY one of the new wonder drugs, chloromycetin, can be manufactured synthetically, and welded stainless and aluminum vessels and piping systems help to make it possible. Other drugs of this type, such as penicillin and streptomycin, are still being produced by fermentation.

In order to build up the chloromycetin molecule on a chemical production line basis, more than $1,000,000 worth of special equipment had to be installed in the new Parke, Davis & Company plant at Holland, Mich. The main processing building is longer than a football field and has a 40-ft high ceiling. It houses an array of huge, glass-lined and stainless steel vats, stills, evaporators, storage tanks, filters and reactor kettles. Scores of miles of piping and conduit are used to route the various chemicals in process.

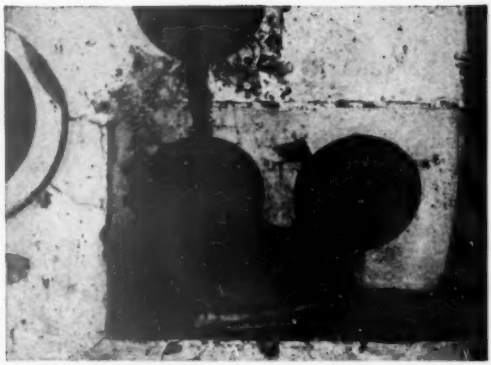
More than four miles of aluminum tubing were used to connect a buried 124,000 gallon tank farm where special chemical solvents are stored.

Clinically, chloromycetin has had a dramatic history. It treats a wide range of diseases running alphabetically from amebiasis through gonorrhea, radiation sickness, Rocky Mountain spotted fever, syphilis, etc.

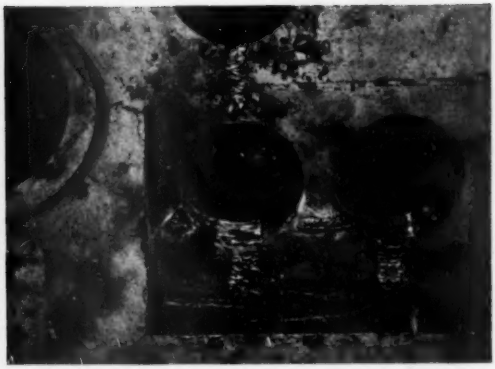
* * *

Worthington Changes Firm Name

STOCKHOLDERS of Worthington Pump and Machinery Corp. recently voted to change the company name to Worthington Corp. In the words of H. C. Ramsey, president, "While we are proud of the fact that the name 'Worthington' has meant 'pumps' to the world for more than a century, we are equally proud that during this same period Worthington has extended its manufacturing activities into many other fields.



BEFORE: This 5-ton gear case casting was shattered into 3 pieces.



AFTER: The same casting 24 hours later after 60 pounds of 5/32" Ni-Rod "55" were used to repair it.

Close the mill for...

2 MONTHS *to* REPLACE

this casting

OR

24 HOURS *to* REPAIR *it*

with Ni-Rod "55"?

First a broken tooth!

Then the tooth lodged between the gears in the large gear case of this tube straightener.

Next, the resultant force smashed this large grey iron casting weighing about 5 tons.

Delivery on a new casting would take two months and cost several thousand dollars. In the meantime, the whole mill was backed up!

Then a smart master mechanic suggested welding.

So a specialist experienced in welding cast iron was called in.

He examined the casting which had broken into three pieces – the cross section at the breaks being 3" to 4".

His recommendation was Ni-Rod "55."

60 pounds of 5/32" Ni-Rod "55" and twenty-four hours later the job was finished – the casting was saved!

They did the job without pre-heating, using successive passes and peening each bead. After welding, the excess metal was ground off and the casting was ready for service. Thousands of dollars and two months' operating time were saved!

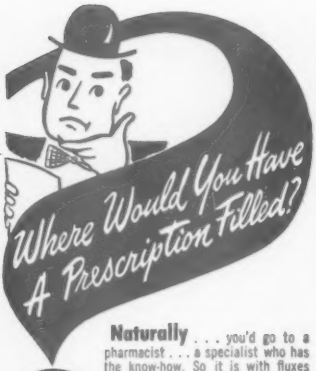
Here is an excellent example of how vital materials and parts can be saved with Ni-Rod.

And that's doubly important today when production is essential. Ni-Rod is playing an important role in defense and you may not be able to get all you need. However, you can always depend on INCO's Technical Service Section for help on your welding problems.

EMBLEM OF SERVICE INCO TRADE MARK

THE INTERNATIONAL NICKEL COMPANY, INC.

67 Wall Street, New York 5, N. Y.



Naturally . . . you'd go to a pharmacist . . . a specialist who has the know-how. So it is with fluxes . . . Special Chemicals engineers have been specializing in the formulation and production of hard soldering and brazing fluxes for more than 20 years. That's why you can depend on KWIKFLUX for better metal joining of ferrous and non-ferrous metals at lower cost. Works perfectly with both low and high melting point hard solders and all types of heat applications . . . direct, indirect and induction heating.

*T.M. Reg. Pat. Nos. 2,174,551 2,196,853 2,452,995

KWIKFLUX

The Proved and Preferred

HARD SOLDERING and BRAZING FLUX

Only KWIKFLUX Has These EXCLUSIVE Features:

- **SUPER WETTING ACTION** speeds work, eliminates lumping or pitting of solder. **Cleans, protects** and **flows** into tightest fitting joints.
- **MIRACLE FLOWING SPEED** — Dependable KWIKFLUX resists evaporation, flows faster, works cleaner and eliminates skip spots. Melts at 780°F and remains stable up to 1800°F and higher.
- **DOUBLE PENETRATION POWER** patented phosphate formula gives KWIKFLUX better bite action and deeper penetration.
- **OBJECTIONABLE FUMES are FIXED** and neutral thereby increasing production efficiency.
- **ANTI-CRYSTALLANT** prevents crystallization in storage.

MEETS ALL RIGID GOVERNMENT SPECIFICATIONS:
U. S. Army #4-1121 • Air Corps #11316-A • U. S. Navy #51F4A • AXS 500-OLD 4-1121 • AMS #3410C

FREE

TRIAL JAR
Yours for the Asking!
Try KWIKFLUX and see for yourself how it saves man hours, materials and money. Prove it to yourself . . . send for your FREE TRIAL JAR . . . just fill in coupon. State type of work and mail today!

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Please send FREE trial jar of KWIKFLUX with complete instructions.

Type of work .....
Type of brazing alloy .....
Type of heat application .....

Name ..... Title .....
Firm .....
Address .....
City ..... Zone ..... State .....

Two Firms Merge Ceramic Coating Interests

RYAN Aeronautical Company, San Diego, Calif., and California Metal Enameling Company have combined their programs for producing ceramic coated parts for high-temperature aircraft uses. The special ceramics that these companies have developed not only extend the service life of alloys but make it possible to use lower grade alloys by giving them extra heat resistance.

It's been found that many vital high-temperature components for jet engines now made of Inconel may be fabricated from type 321 stainless and adapted to the same uses if they have ceramic coatings. Since Inconel contains a minimum of 70% nickel and type 321 stainless only 8 to 11%, a substantial saving can be effected.

At the present time production orders for piston-engine-exhaust systems that are ceramic coated are being fabricated for many overseas airlines as well as for major domestic lines. They are also being used on manifolds for medium Army tank engines.

* * *

How to Avoid and Control Corrosion Shown in Film

"CORROSION in Action," a new sound-color film, was to be shown March 11 at the annual conference and exhibition of the National Association of Corrosion Engineers at Galveston, Texas. The film, prepared by the corrosion engineers' section of The International Nickel Co., shows how corrosion causes an annual loss to industry and property of over six billion dollars. Various means to avoid or control this damage, such as selection of corrosion-resistant materials, the development of new alloys, the use of electric currents for cathodic protection, etc., are pictured in this film, which was produced at the Kure Beach corrosion testing station near Wilmington, N.C., and at the project's new laboratory at Harbor Island, N.C. with other scenes taken in various industrial plants.

The new film will be released for use in schools, colleges, industrial plants and before technical societies after its premiere on March 11. Bookings can be made through The International Nickel Co., Inc., 67 Wall St., New York City 5.

* * *

If you pick up a starving dog and make him prosperous, he will not bite you. That is the principal difference between a dog and a man.—Mark Twain

TIME is MONEY

and THERMACOTE PRODUCTS SAVE BOTH

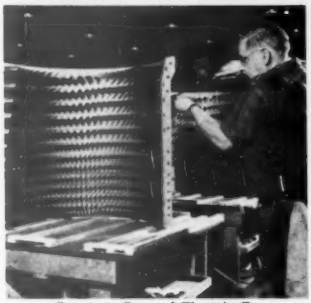
THERMO *Spiral*
TIP CLEANERS
are guaranteed unbreakable. They do a cleaner, smoother job because the new spiral design prevents carbon and slag from jamming in the orifice and eliminates breaking of the cleaner when cleaning tip.

TRIPLE DUTY COVER LENS
are guaranteed to outlast any lens at any price. They provide clearer vision, eliminate eye strain.

KORNER KLAMP

PAY FOR THEMSELVES EVERY TIME USED
because a perfect 90° angle is assured every time when welding 2 pieces and spoilage is eliminated.

THERMACOTE CO.
NEWARK CHICAGO LOS ANGELES



Courtesy General Electric Co.

FABRICATED stator blade (top left) for jet engine compressor section costs 55% less to manufacture than present forged blade (top right) and also saves up to 39% on critical materials. Precision hammered bases on forged blades must be fitted into a blade ring in the compressor. New welded blades have bases interchangeable with old ones or can eliminate need for blade ring entirely. Hundreds of these stator blades are needed for a single aircraft engine.

* * *

Purdue University Installs Welded Testing Machine

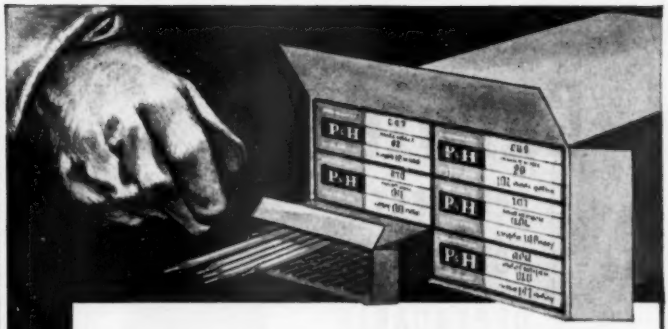
THE first Baldwin testing machine of 600,000 lb capacity that has welded columns and base has been installed in the structures laboratory at Purdue University, Lafayette, Ind. Baldwin-Lima-Hamilton Corp. has revised design of all its testing machines of this type to welded construction.

The big tester will be used for research on concrete and steel structures. Sponsors for testing projects include the Association of American Railroads, Column Research Council of the Engineering Foundation and Research Council for Riveted and Bolted Structural Joints.

A duplicate of this machine will soon be installed at Howard University, Washington, D. C. Largest capacity Baldwin testing machine with welded columns and base is a 1,000,000 lb machine in the laboratory of the Portland Cement Association, Chicago.

* * *

Knouledge is the only instrument of production that is not subject to diminishing returns.—J. M. Clark



Now — in one handy package
— an assortment of electrodes to meet every emergency!

NEW P&H
Maintenance Pack

At your fingertips — an assortment of five different kinds of rods for repair and maintenance welding. Packaged to stay dry — clearly identified to make selection easy.

With the P&H Maintenance Pack, you no longer have to buy seldom-used rods in quantities larger than you need. Instead, in one convenient package, you can keep some of each type on hand — economically!

And you're equipped to do all kinds of jobs — with fast, easy, sound welds. Just look at what the versatile P&H Maintenance Pack gives you:

1. **5 lbs. each AC-3, 1/8", 5/32", 3/16"** — For all position welding of mild steels and sheet metal. Can be used with AC or DC welders.
2. **5 lbs. AC-1, 5/32"** — For mild steels. The most universal electrode yet developed. Unusually easy to handle in any position, with good penetration. AC or DC.
3. **5 lbs. 70LA2, 5/32"** — For welding high-carbon, alloy, high-sulfur, free-machining, cold-rolled, and other hard-to-weld steels. Ideal for steel casting repairs. AC or DC.
4. **1 lb. Harstain, 1/8"** — For spring steels and stainless steels of all kinds. AC or DC.
5. **1 lb. Nicast, 1/8"** — For machinable welds on cast iron. Nicast welds are strong and non-porous.

$13.50 COMPLETE

Let the P&H Maintenance Pack save time, trouble, and money for you. Order from your P&H representative or local distributor. Mail coupon for name of one nearest you, and for further information.

P&H WELDING DIVISION
HARNISCHFEGER CORPORATION
4513 WEST NATIONAL AVENUE
MILWAUKEE 14, WISCONSIN

POWER SHOVELS • CRAWLER AND TRUCK CRANES • OVERHEAD CRANES • HOISTS • ARC WELDERS AND ELECTRODES • SOIL STABILIZERS • DIESEL ENGINES • PRE-FABRICATED HOMES.

Tear out coupon and mail today!

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4513 W. National Ave., Milwaukee 14, Wis.
Send me information on new P&H Maintenance Pack and name of nearest dealer.

Name.....
Position.....
Company.....
Address.....
City.....(.....) State.....

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Carbide
EFFICIENT
ECONOMICAL
DEPENDABLE
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Welding & Cutting
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NATIONAL CARBIDE IN THE RED DRUM
Write us for information as to nearest available stock.

NATIONAL CARBIDE COMPANY
A Division of Air Reduction Company, Inc.
60 E. 42nd St., New York 17, N. Y.

Get All-Around Vision and Protection

with WATCHEMOKET eye SAVERS

TUC-AWAY WELDER'S GOGGLE

Here's the ideal flash goggle for under-helmet use and other glare and impact hazards! Each Tuc-Away lens and side shield is a one-piece plastic unit providing wide-angle vision and *sure* eye protection. 3 different "change-around" lens units are available for various types of eye hazards. Exclusive Retrax "telescoping" temples assure perfect fit and comfort. Order from your welding (or safety) supplier or write direct.

FREE! *Send for magazine article giving impartial advice on best uses of plastic eye protection. Eye-Savers catalog also included.*

WATCHEMOKET OPTICAL CO., INC. DEPT. 5, PROVIDENCE, R. I.
Producers & Originators of Practical Plastic Eye Protection

Aircraft X-ray Lab Built by Temco

ONE of the largest and best-equipped radiological laboratories in the aircraft industry has been placed in service at Texas Engineering and Mfg. Co., Inc., Dallas, Tex. It is capable of processing 70,000 sq ft of film in an 8-hr working day.

Heart of the installation is a 25,000 volt industrial X-ray machine mounted on a motor-operated jib crane. Crane and X-ray are inside a 22 by 33 ft room lined with 79,000 lb of sheet lead.

Capacity of the X-ray machine is 4 in. of steel, 3 in. of bronze, 14 of aluminum and 16 to 18 in. of magnesium. Objects as large as 6 by 10 ft may be inspected with the versatile crane mounting.

* * *

Navy Uses Plastic Pipe to Save Copper and Nickel

AN eight-month sea test proved to the Navy that about two tons of copper and nickel could be saved by installing plastic piping systems in several new mine sweepers. Savings in copper-brass piping are also expected.

The plastic pipe was tested in strategic uses in the machinery of a destroyer escort. The Norfolk Naval Shipyard, Norfolk, Va., did the installation under guidance of the U.S. Naval engineering experiment station at Annapolis, Md.

Installation costs of 2-in. diam plastic piping (⅛-in. wall) promises to be about $0.70 per foot when it is more widely used. Putting in similar sizes and thicknesses of copper-nickel pipe costs $1.55 per ft and stainless steel $2.25. Tests also indicate that maintenance costs should be less because some plastics outlast metals.

* * *

To obtain additional information on any advertised products, use the cards on pages 17-18.

1951 Steel Output Equals Entire Pre-1900 Tonnage

STEELMAKING furnaces now turn out as much steel in a single year as was made in this country throughout the years of the early Colonial days to 1900. Furnaces now have the capacity to make almost 108.6 million tons of ingots and steel for castings annually. This capacity was increased more than 4.3 million tons during 1951. Capacity per person today is about 1,400 lb, as compared with 807 lb in 1939.

The 1951 rise in capacity alone would provide finished steel for all the following items: 1,000,000 passenger autos; 800,000 household refrigerators; 800,000 domestic cooking stoves; 10,000 freight cars; 1,000,000 television sets; one aircraft carrier; two heavy cruisers; 500,000 three-inch shells; 500 Army tanks; 10,000 airplanes; 3,000 six-room houses; leaving about 65,000 tons of finished steel for other uses.

* * *

Eutectic President Leads Sunday-School Drive

RENE D. WASSERMAN, president of Eutectic Welding Alloys Corp., served as chairman for the welding industry in the Eighth Annual Sunday School Week Drive, April 14-20. The week-long recognition of the labors of the nation's Sunday schools was celebrated by all faiths through the leadership of the Layman's National Committee, a non-profit organization supported by all faiths.

Nathaniel Leverone, Chicago industrialist and civic leader, was the national chairman for this year's observance of Sunday School Week.

"Somebody rang it while I had my head inside!"

YOU CAN TEAM UP
A GB SILVER BRAZING
ALLOY AND FLUX
TO GET
PERFECT RESULTS!
NO MATTER HOW YOU HEAT...
The method of heating for low temperature brazing is a decided factor in the selection of the right silver solder and flux. Specify GB and you're right, because you'll get a combination that was made to work right!
OXY-ACETYLENE
INDUCTION
AIR-GAS
SALT BATH
BUNSEN BURNER
OXY-HYDROGEN
OXY-PROPANE
OXY-CITY GAS
CARBON TONGS
RESISTANCE
FURNACE BRAZING
CHARCOAL
BLOW PIPE
GB's line of six standard silver solders offers a range which meets standard production methods. When special solders are required, GB's Technical Service Division offers assistance which is based on experience in alloying and refining precious metals that goes back more than 80 years.
GB Standard Silver Solders
GB No. 50 Silver Solder, melting range 1160-1175°F
GB No. 50N Silver Solder, melting range 1240-1260°F
GB No. 45 Silver Solder, melting range 1125-1145°F
GB No. 41 Silver Solder, melting range 1125-1160°F
GB No. 35 Silver Solder, melting range 1130-1270°F
GB No. 31 Silver Solder, melting range 1130-1300°F
GB FLUXES
The physical properties and appearance of a brazed joint are controlled to a large degree by the flux which is used. For this reason it will pay you to team-up GB Flux with GB Silver Solder—they were developed to produce maximum results when used together.
GB DATA BOOK
Here's real factual data on all of the important phases of low temperature brazing. You can get a free copy from your GB Distributor — Write us and a copy will be forwarded to you.
GOLDSMITH BROS. SMELTING AND REFINING CO.
1304 W. 59th Street, Chicago 36, Illinois
Suppliers of Precious Metals to Industry Since 1867

DryRod

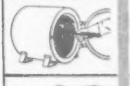
stops moisture pickup... saves welding dollars

keeps mineral-coated electrodes dry—to operate at top efficiency

Eliminate careless storage and get better efficiency from *low-hydrogen* and *stainless steel* electrodes by installing Type 300 DryRod Electrode Ovens (capacity 350 lbs.). You get orderly, mobile storage, plus wide temperature range, 175°-600° F that not only safe-holds freshly unpackaged electrodes, but *saves* by rebaking, coatings exposed to shop humidity for longer periods. DryRod is saving welding *dollars* for leading fabricators — how about you? Send coupon NOW for more information.

How DryRod Ovens can give you better electrode control

1. Store sealed cartons in warm, dry place.



2. Place unpackaged electrodes in DryRod Oven and withdraw systematically.

3. Locate DryRod as close to welding operations as possible.

4. For extension of DryRod protection to isolated spots, use Portable DryRod, T-15.

Philip Roden Co.

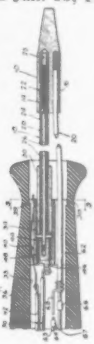
1721 E. Lake Bluff Blvd.
Milwaukee 11, Wis.
Clip coupon, attach to letterhead or mail direct for new bulletin DR-2.

NAME .....
FIRM .....
ADDRESS .....
CITY..... ZONE...STATE.....

DryRod—Trademark PR-4

Soldering Iron

2,582,481. HOWARD A. DVORAK, Brookfield, Ill., JAMES W. JUVINALL, Indianapolis, Ind., and MERTON R. MILLER, Lombard, Ill. Assigned to Western Electric Co. Filed Dec. 16, 1950. Granted Jan. 15, 1952.



A newly patented soldering iron comprises a metal tip having a pair of recesses extending longitudinally from its rear end. A rod-like heating unit and a rod-like thermocouple are arranged side by side and have their forward ends mounted in the recesses of the tip. The thermocouple comprises a wire element of one metal and a tubular element of another metal disposed about the wire in coaxial relation. The tube is bonded at one end to one end of the wire to form a hot junction within the tip. Insulating material loosely supports these elements in spaced relation to each other. A handle is disposed in spaced relation to the tip for supporting the heating unit and the thermocouple. The heater and thermocouple can be connected to a power circuit and a control circuit, respectively, of a remote control unit.

* * *

Crack-Free Hard-Facing Method

2,584,161. GEORGE F. SCHERER, San Francisco, Calif. Assigned to Rockwell Mfg. Co., Pittsburgh. Filed Aug. 20 1945. Granted Feb. 5, 1952.

This patent covers a method for producing a crack-free coating of hard-facing material that has a high melting point and negligible ductility. It is one of the group consisting of nickel-chromium-boron and cobalt-chromium-tungsten alloys. Before being deposited on a bearing surface of a steel valve member, this hard-facing material requires a preliminary step. This consists of depositing a "cooling-stress-absorbing" layer of a ductile nickel or high nickel alloy on the weld area. Welding on the hard-facing alloy over this layer reduces the chance for cracks.

Mk-h 100%
Pk-h 100%
Se 100%
Tr 100%
ED 100%

THE FORMULA THAT ALWAYS MAKES GOOD

All-State

ALLOYS AND FLUXES

FOR WELDING BRAZING SOLDERING TINNING CUTTING

It's the formula that accounts for the high rate
- in application speed
- in uniformity
- in operator training
- in dependability
- in quality

which characterize the wide use of ALL-STATE Alloys and Fluxes.

It's the formula we use continuously. Interpreted:
Mk-h — Metallurgical know-how
Pk-h — Practical know-how
Se — Service
Tr — Training
ED — Excellent Distributors

A-S DISTRIBUTORS *EVERYWHERE*

Ask for a free copy of 32-page Buyers Guide to the complete line of ALL-STATE Alloys and Fluxes.

ALL-STATE

WELDING ALLOYS CO., INC.
White Plains, N. Y.

About People

JUSTICE LOCKWOOD has been appointed vice-president in charge of sales for The American Brass Co., Waterbury, Conn. He was formerly manager of the Buffalo, N. Y., branch office. His headquarters will be at Waterbury, according to Arthur H. Quigley, chairman of the board.

* * *

WILLIAM W. SIEG has been named the 1952 recipient of the David F. McFarland Award given by the Penn State chapter of the American Society for Metals. He is president of the Titan Metal Mfg. Co., Bellefonte, Pa. He graduated from Penn State with a BS degree in 1923 and a MS in 1925.

* * *

J. S. ROSCOE and G. E. TENNEY have been elected to the board of directors of The Lincoln Electric Co., Cleveland. Mr. Roscoe has been with Lincoln since 1924 and is director of purchasing for the company. Mr. Tenney joined Lincoln in 1932 and is service manager for the firm.

* * *

J. F. WAGNER, vice-president of the Burdett Oxygen Co., Cleveland, was named to the Oxygen Industry Advisory Committee of NPA recently for a term ending Oct. 1.

* * *

L. R. PALMER is in charge of the Cincinnati office of Scott-Tarbell Inc., Cleveland welding supply firm.

* * *

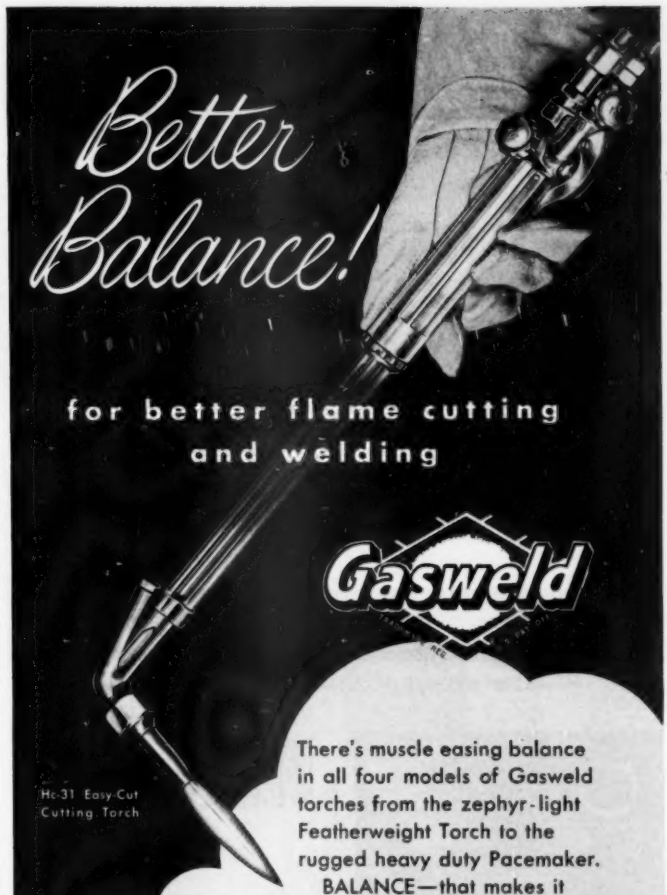
NORMAN A. MATTHEWS has been appointed assistant chief metallurgist of American Brake Shoe Company's metallurgical research department at Mahwah, N. J.

* * *

EDMOND C. POWERS has been elected general chairman of the All-Ohio Public Relations Workshop to be held in Cleveland May 8. He became well known in public relations for the arc welding industry in 1934.

* * *

JOHN J. RADIGAN, JR., has been named vice-president in charge of industrial relations at P. R. Mallory & Co., Inc., Indianapolis.



There's muscle easing balance in all four models of Gasweld torches from the zephyr-light Featherweight Torch to the rugged heavy duty Pacemaker.

BALANCE—that makes it easy to handle long jobs—that cuts down fatigue—that steps up output.

That's just one of the features of this outstanding line—get the full facts—write for Catalog No. 5026 covering the full line of the famous "Gasweld" welding and cutting equipment.

Liquid also produces Oxygen, Acetylene and other commercial gases including CO_2 in all its forms—Gas, Liquid or Solid (dry ice) for industrial use.

THE LIQUID CARBONIC CORPORATION
INDUSTRIAL GAS DIVISION
3110 South Kedzie Avenue, Chicago 23, Illinois

Gentlemen:
Please send me your new Catalog No. 5026 of welding and cutting equipment and supplies.

The Liquid Carbonic Corporation, Industrial Gas Division
3110 South Kedzie Avenue, Chicago 23, Illinois

Name_____
Firm_____
Street Address_____
Town_____ State_____

Multi-Pic
WELD CLEANING HAMMER

HAS 5 CONTOUR FORMING HEADS

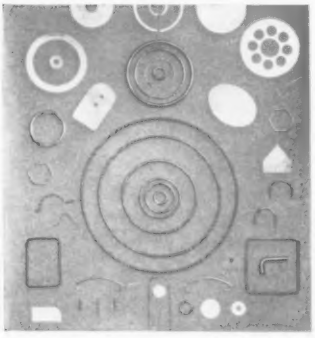
Patented FREE-FLOATING HEAD design delivers FIVE cleaning blows with each swing.

CUTS TIME—Cleans FIVE times faster

CUTS COST—Lasts FIVE times longer
THAN SINGLE HEADED HAMMERS

Illustrated Model No. MP-2-M $2.40 each—quantity prices 10% to 20% less.
Wood Handle and Brush equipped Models also available—Write for Booklet Form MP-6.

Mfg. by
BERNARD WELDING EQUIPMENT CO.
10232 AVENUE N, CHICAGO 17, ILLINOIS



LOWER YOUR PRODUCTION COSTS WITH

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"PREPLACED FORMS"

Advantages of Silver Brazing "Preforms"

Use SILVALOY Preplaced Forms to get faster, more economical production. With Preforms you accurately control the quantity of alloy used on a job... maintain uniform quality throughout your brazing operation. There's a wide variety of rings, washers, discs and special shapes to meet your requirements. Write us today for full information.

STEEL SALES
3348 S. PULASKI ROAD . CHICAGO 23, ILLINOIS
PLANTS: DETROIT, ST. LOUIS, MILWAUKEE, MINNEAPOLIS
OFFICES: INDIANAPOLIS, GRAND RAPIDS, KANSAS CITY

DAVID R. WARNER was named sales manager of Miller Electric Mfg. Co., Appleton, Wis. He has worked in the welding industry in various sales jobs since 1936 and most recently covered the near-western territory as district sales manager. He will do personal contact work with division sales manager and all Miller distributors. He succeeds the late R. A. Metcalf.

* * *

WALTER BENDER has been appointed sales manager of the carbide division of Shawinigan Products Corp., New York City.

* * *

DON TOMICH has taken over as sales manager for Pacific Welding Alloys Mfg. Co., Los Angeles. He will direct all sales and promotion for the company.

* * *

ARTHUR H. SMOCK has been appointed traffic manager for The American Welding & Mfg. Co., Warren, O. ARTHUR GRAY, who has held the post for 27 years, will remain with the company as a consultant.

* * *

G. G. WILLSON has been made manager of the technical service section of the coated abrasives laboratory at Minnesota Mining and Mfg. Co., St. Paul, Minn. He has been with the coated abrasives division of "3M" since 1935.

* * *

HAROLD L. HERNDON has been appointed district manager for sales in the Cleveland district for the Raytheon Mfg. Co., Waltham, Mass. ALBERT R. WOLFE has been made service manager.

* * *

ROBERT B. WELCH has been appointed regional manager for Los Angeles and the West Coast for Eutectic Welding Alloys Corp., Flushing, N. Y. WOODROW W. SHACKLEFORD will head the new sales region established by Eutectic for Buffalo and upstate New York.

* * *

THOMAS LONG has been made sales engineer for Progressive Welder (Canada) Ltd. in the Toronto-Hamilton-Oshawa area. A native of Toronto, he studied at the University of Detroit, University of Buffalo and the Rackham Foundation.

Tempilstik°

the amazing Crayons that tell temperatures

A simple method of controlling working temperatures in:

- WELDING
- FLAME-CUTTING
- TEMPERING
- FORGING
- CASTING
- MOLDING
- DRAWING
- STRAIGHTENING
- HEAT-TREATING IN GENERAL

It's this simple. Select the Tempilstik° for the working temperature you want. Mark your workpiece with it. When the Tempilstik° mark melts, the specified temperature has been reached.

$2 each gives up to 2000 readings

Available in these temperatures (°F)

113	263	400	950	1500
125	275	450	1000	1550
138	288	500	1050	1600
150	300	550	1100	1650
163	313	600	1150	1700
175	325	650	1200	1750
188	338	700	1250	1800
200	350	750	1300	1850
213	363	800	1350	1900
225	375	850	1400	1950
250	388	900	1450	2000

Also available in pellet or liquid form

FREE —Tempil° "Basic Guide to Ferrous Metallurgy" — 16¼" by 21" plastic-laminated wall chart in color. Send for sample pellets, stating temperature of interest to you.

Tempil° corp.
134 WEST 22nd STREET
New York 11, N. Y.

EDWIN M. MILLER has been appointed plant superintendent of the machine division of The Lincoln Electric Co., Cleveland. He has been with Lincoln for 29 years. Head of the production control department for 10 years, he is largely responsible for a new production control system just put into operation in the new Lincoln plant. His appointment follows the resignation of H. F. KNEEN, vice-president in charge of manufacturing at Lincoln.

* * *

H. M. REESER, vice-president and secretary, and D. M. Horner, vice-president, have been elected to the board of directors of the Harrisburg Steel Corp., Harrisburg, Pa. Mr. Reeser has worked for Harrisburg for 34 years and Mr. Horner, in charge of engineering and operations, has been working there for 24 years.

* * *

Died . . .

HOMER W. CESSNA, 54, owner of the Cessna Welding Supply Co., Baton Rouge, La., died March 13. He was survived by his wife, Clara. He was a native of Georgia though he lived in Baton Rouge for the last 10 years. He was a director of the National Welding Supply Association and a member of the Elks and Sertoma International.

* * *

CHESTER D. MOTT, 64, research engineer for the Fansteel Metallurgical Corp., North Chicago, Ill., died on April 1. He was formerly associated with the research organizations of the Stoody Company and National Cylinder Gas Co.

* * *

DR. LEWIS WARRINGTON CHUBB, 69, director emeritus of the Westinghouse Research Laboratories and nationally known scientist, died April 2. He worked for 42 years with Westinghouse and was director of research from 1930 to 1948. He received the John Fritz Medal and Certificate in 1946 and had some 150 patents to his credit.

* * *

FRANCIS F. GREGORY, merchandising coordinator of A. O. Smith Corp., died March 8. He joined A. O. Smith in 1944 to serve as sales promotion manager, and then public relations director.

HOBART 12 electrode (E-6012)

...for use in any position with *AC* or *DC* current

What ONE electrode can handle 80% of all your production work? What ONE electrode is today's best buy for all-purpose welding? The answer to both questions is the same—the Hobart "12". It's truly a premium electrode in both quality and performance—yet actually costs you less than any other E-6012 electrode because it gives you more actual weld deposit, increased production, less clean-up time.

YOU CAN STANDARDIZE on Hobart "12"—many of the country's largest fabricators of tanks, automobile frames, agricultural implements, etc., already have. They tell us that the Hobart "12" is the most versatile electrode they have ever used. They tell us, too, that the Hobart "12" goes further—leaves more actual weld deposit per electrode because there's less spatter and less stub loss, even when higher than normal welding currents are used.

You've tried the rest . . . now try the best. Write us today for complete electrode catalog and free samples of the Hobart "12" to try on your next job. You'll be glad you did.

HOBART BROTHERS COMPANY
Box U-521, Troy, Ohio
"One of the world's largest builders of arc welders"

Simplify all your welding by using HOBART ELECTRODES

Tippy Says: ABRAHAM LINCOLN WELDED OUR NATION INTO ONE!

Tippy Says: . . . Take a tip, try TIPALOY!

Abe, America's No. 1 Welder, did a tight job of welding the North and the South into one solid country.

You, too, can have tighter welding jobs, welding that will be classed as the finest, if you use America's No. 1 Welding Electrode . . . TIPALOY!

Write today for test samples and "the story of STRAIGHT LINE conductivity!"

Tipaloy INC. 1435 EAST MILWAUKEE DETROIT 11, MICHIGAN

No. 12 of a Series

Branches in All Principal Cities

"Shortstub" ELECTRODE HOLDERS

Convert the total fluxed portion of all electrodes into weld metal —REDUCE STUB WASTE TO THE LOWEST POSSIBLE

TWO SIZES FILL ALL NEEDS

Model	Length Inches	Wt. Ozs.	Cap. Amps.	ELECTRODE Size	LIST PRICE
No. 4	8⅞"	17	400	1/16" to ¼"	$6.90
No. 6	10⅞"	24	600	3-32" to ⅜"	7.90

Quantity Prices 10 to 20% less *Write for FREE 16 Page Booklet FORM SS-3*

Mfg. by

BERNARD WELDING EQUIPMENT CO.

10232 AVENUE N CHICAGO, ILLINOIS

HOUSTON OXYGEN PLANT

(Continued from page 33)

tomer's profits without even considering the greatly reduced hazards."

Liquid Oxygen Transportation

For industrial plants not on the pipeline, the company is able to provide large banks of permanently placed tubes 20 ft long for the storage of oxygen. A fleet of specially constructed tank trucks will carry liquid oxygen under atmospheric pressure right out to the customer's permanent storage bank. Heretofore, smaller storage banks were mounted on large, flat trailer-trucks, which had to be towed back to the oxygen plant for refilling.

Cyrus K. Rickel, vice-president of the company, explained how the new system will work.

"Without interruption to the customer's production requirements, one of our liquid oxygen trucks will tie a feed line into the customer's storage bank. By using an evaporator and pump to convert the liquid oxygen into dry oxygen gas right on the truck, the customer's storage bank of tubes will be refilled. One such truck will carry a load of liquid oxygen equivalent to what it formerly required eight trucks to supply in oxygen gas. No interruption to the customer's production requirements, and no more hauling of empty cylinders or tubes back to the plant!"

These tank-trucks are intended to supply only large industrial users of oxygen. Of the three trucks now nearly completed, one will carry sufficient liquid oxygen to provide 90,000 cu ft of gas; the second will carry the equivalent of 150,000 cu ft of gas and the third (a trailer unit) will carry the equivalent of an amazing 280,000 cu ft of gas. This is American industrial ingenuity working in high gear.

Nitrogen and Argon Demands

Harry K. Smith, a director of the Houston Oxygen Co., had something to say about uses for nitrogen gas. "By using inert nitrogen to purge oxygen from pipelines, tanks and ships carrying butane, gasoline, oil, chemicals, etc., the danger of explosion is minimized. This use is increasing every day.

"Large quantities of nitrogen are also used in fire-fighting, and in the manufacture of fire extinguishers of certain types. The inert gas smothers flames by preventing the oxygen in the air from reaching the fire. It is also used as a shield against fire and explosion of chemicals due to decomposition in storage or while being processed.

"And it may surprise some to learn that nitrogen gas is now used to prevent rust and rot in the storage of iron and steel products, 'eggs—yes, that's right, eggs—and many other items. These uses—plus the manufacture of electric light bulbs, radio and television tubes, X-ray tubes, etc., and extensive use in laboratory processes, testing and research—comprise a tremendous demand for pure nitrogen gas."

Everyone in the welding industry knows how argon gas is being extensively used in the inert-arc process to weld aluminum, copper, brass, magnesium, stainless steel and even cast iron and plain-carbon steels under certain conditions. Argon is also mixed with other gases for filling electric incandescent lamps and neon and fluorescent tubes. According to Mr. Herzstein, there are but three other producers of pure argon in the country—none in the southwest.

Old Plants Discontinued

The executives of this company are also officials of a group of eight other affiliated companies, largest of which is the Big Three Welding Equipment Company, of Houston and Fort Worth and 16 other cities. Houston Oxygen Company's new plant adjoins Big Three's new million-dollar Houston plant, opened just last October.

As soon as the new fleet of liquid oxygen trucks is ready to roll, the present plants at Orange, San Antonio, Corpus Christi and Brownsville, Texas, will discontinue producing oxygen gas and will be converted to the storage of liquid oxygen shipped by trucks from the new Houston plant. By using evaporator units and pumps, each plant will convert the liquid oxygen to dry oxygen gas as needed to supply its area. Cylinder filling and delivery will complete operations at these points. The oxygen plants at Fort Worth and Borger, Texas, and probably the plant at Tulsa, Okla., will follow a similar pattern of conversion.

60 more workers
WYPO
Wipes and POlishes
CUTTING and WELDING
TIP CLEANERS
STANDARD SET OF 12
Cleans 27 Drill Sizes.
Nos. 75 to 49 Incl.
JUMBO SET OF 9
Cleans 19 Drill Sizes.
Nos. 48 to 30 Incl.
U.S. Patent No. 2,429,581
In Canada 1948
WYPO
The exclusive circle design found only in Wypo Cutting and Welding Tip Cleaners provides as many as 60 more cleaning edges per inch of cleaner. Straight sided valleys, another outstanding feature of Wypo Tip Cleaners, insures a thorough cleaning and removal of all waste.
DOUBLE THE LIFE OF YOUR WELDING AND CUTTING TIPS
Fast, easy cleaning without jamming, scratching or enlarging the tip port means added years of service to your welding and cutting tips. Only with Wypo Tip Cleaners do you get thorough cleaning and polishing with one quick and easy motion. Wypo Tip Cleaners are specified for all types of welding cleaning jobs by the U.S. Navy, leading railroads, oil companies, steel mills, ship yards and industrial plants. Packed in a handy metal container.
Recommended and sold by the world's largest manufacturers of welding equipment
MAITLEN AND BENSON INC.
1395 Obispo St., Long Beach 4, Calif.
Buy Wypo Tip Cleaners at your welding supply dealers today

Specify CMD
CHIPPING HAMMERS
— The Finest Tools Made for EVERY Weld Cleaning Need
TYPE CB . . . A favorite for many years, this hammer is 3 tools in 1—drift, chisel, and removable wire brush.
TYPE A . . . Drift and chisel of high-grade steel. Popular in malleable and grey iron foundries.
TYPES EB and FB . . . models E and F can be supplied with brush as shown here. Brush can be replaced.
TYPE E . . . head of high-grade steel has drift and chisel. Special hand grip absorbs shock.
Order from your dealer. Write today for descriptive circular 2-W.
CMD
CHICAGO MANUFACTURING & DISTRIBUTING CO.
1928 WEST 46th STREET • CHICAGO 9, ILLINOIS

"Pro-Clamp"
MECHANICAL HANDS

MAKE
Fitting—
Positioning—
Holding
and
Welding a
One-Man Job

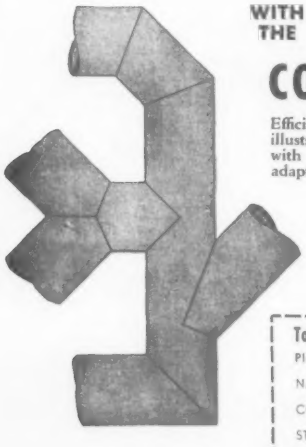
Handles plates, shapes, rods, pipes, etc., at any angle, 0 to 180°—Positive accuracy without templates or fixtures—abolishes tack welding.

Model A, 1" max. jaw capacity $10.50 each.
Model B, 2½" jaw capacity $17.50 each.
Quantity prices 10 to 20% less.
Write for FREE booklet Form PCB-6

Mfg. by
BERNARD WELDING EQUIPMENT CO.
10232 AVENUE N CHICAGO 17, ILLINOIS

SAVE TIME and MONEY
NEW EASE AND SPEED
ON PIPE AND
STRUCTURAL STEEL
LAYOUT JOBS

WITH
THE
CONTOUR MARKER



Efficient, accurate, easy to use. Any of the angles illustrated can be marked off in 5 minutes or less with assured accuracy. Both models complete with adapter for square or rectangular shapes.

STANDARD MODEL
Fits into hip pocket. For use on pipe 1½ to 18 inches.

JUMBO MODEL
For 16 to 48 inch pipe. Includes belt to fasten on pipe.

IF YOUR LOCAL DISTRIBUTOR CANNOT SUPPLY YOU CAN ORDER DIRECT.

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Please send me full details on the Contour Marker.
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STREET
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BOOK REVIEWS

Oxyacetylene Welding

JEFFERSON'S GAS WELDING MANUAL. By T. B. Jefferson. Published by Associated Business Counselors, P. O. Box 112, Skokie 1, Ill., 1952. Paper, 5 by 7½ in., 112 pages. Price $2.

New arrangement of material, concisely presented, is featured in this welding book. Written for the reader who knows how to weld, it is designed to fill in gaps in his knowledge of various metals and processes.

Beginners can learn how to do simple gas welding and flame-cutting from the book however, since operating instructions and explanations are carefully planned. Welding fundamentals here are based on mild steel applications.

An unusually practical innovation in the book should be handy to both the inexperienced weldor and the advanced student. Called "Jiffy Welding Guides," 20 separate sections present a brief round-up of basic facts for joining any metal that is weldable by the oxyacetylene process.

Common denominators for each of these "Jiffy Welding Guides" are the terms for steel welding. By translating them into temperatures and procedures for welding all other metals, brazing, braze-welding and hardfacing can be easily explained.

The flame cutting of various metals is covered in a similar series of guides. A third valuable part of the book is a chart that aids in the quick selection of the right process for joining dissimilar metals by gas welding (see Engineering Data Sheet No. 140, page 51, this issue).

Additional useful tables, charts and clear illustrations throughout make this a complete and compact help for the weldor and flame-cutting operator.

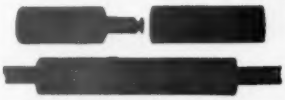
* * *

Industrial Arts

GENERAL METALS. By John L. Feirer. Published by McGraw-Hill Book Co., New York, 1952. Cloth, 6½ by 9½ in., 257 pages. Price $3.50.

General Metals is the first of a new series of books by McGraw-Hill designed to answer the need of a modern industrial arts program in general metals. It is planned for the average metal shop, the general metals area of a large shop or for the home metal craftsman.

For students, it gives basic instructions in the fundamentals of metal working and the related information that will make them more intelligent producers and consumers of metal.



TWECO CABLE CONNECTORS

—"SOL-CON" (solder type)

—"MEC-CON" (mechanical)

Quick-detachable connectors. Add on cable. Take off cable. Attach holder whip cables. Split male plug permits adjusting spring tension for electrical contact. Two sizes, Sol-Con; three sizes, Mec-Con for #6 through 4/0 cable.

Tweco "Sol-Con" and "Mec-Con" plugs fit the female part of Tweco Terminal Connectors for quickly connecting cables to the welding machine and to switch polarity. They are COMPANION ITEMS.

See Your Welding Supply Distributor

Tweco

TWECO PRODUCTS

PRODUCTS COMPANY

BOSTON AT MOSLEY

WICHITA, KANSAS

SPECIAL GLOVE DEVELOPMENT BY

RACINE

THREE STYLES

- 380 Horsehide
- 384 Pearl Carpincho (wildpig)
- 386 Cowhide

Chrome tanned Heat Resistant Split Leather—Heat Breaker Back Lining—LARGE size—

1. One piece back.
2. One piece palm.
3. Thumb seam protected by wide leather strap.
4. All vulnerable seams welted.
5. Palm side of thumb is protected by extra leather overlay.

• Send for booklet on these and other GARDSMEN Protective Equipment.

RACINE GLOVE COMPANY, INC.

RIO, WISCONSIN

The book is made up of 62 sections, each dealing with a basic operation. Directions for performing the described task are presented as well as related notes on equipment, tools, metals and vocational opportunities. There are sections on bench metal, sheet metal, art metal and jewelry, forging, heat-treating, foundry, welding, machine shop and metal production. Subjects at the beginning of the book deal with elementary shop jobs and the final ones suggest finished products. The welding section briefly discusses gas and arc welding.

Numerous illustrations are spaced throughout the book together with helpful discussion questions. The book is well-suited to teaching or to home study.

* * *

Supervising Men

HOW TO SUPERVISE PEOPLE, third edition. By Alfred M. Cooper. Published by McGraw-Hill Book Co., New York, 1952. Cloth, 5½ by 8 in., 254 pages. Price $3.75.

The practical viewpoint and simple, direct treatment that made the first edition of this book so helpful have been retained for the third edition. Yet, the new production is almost completely rewritten to apply to 1952 working conditions.

Opening with the development of the "supervisor" and the important role he has assumed in recent years, the first chapter also provides an extremely pertinent discussion of the Taft-Hartley law. Other rich material in this first chapter includes thoughts on the rights of the worker and his supervisor, the true function of the supervisor and future trends in labor relations.

The remaining 10 chapters cover such subjects as getting increased production, development of leadership qualities, promotion of teamwork, prevention of industrial accidents, training subordinates and improving business relations. Under these headings are introduced examples of typical problems: hiring, disciplining, enforcing safety rules, training new help and delegating authority.

Truly helpful hints are suggested for common labor problems and their realistic solutions. Thoughtful questions, 25 pages of them, are given at the end of the book and would be excellent material for leadership training programs.

How to Supervise People has a definite message for all supervisory personnel, experienced or newly-appointed, in shop, field or office. Executives would do well to look over, too.

Selecting optimum welding heat is easy with the portable Mullenbach ARCTROL . . . permits voltage adjustments *while* you weld, *where* you weld!

Saves time-wasting trips to the welding machine, eliminates voltage approximations, permits instant remote control as job requirements vary. A necessity on precision welding—a tremendous help on production welding!

Completely portable, foot operated. Normal welder range unaffected. Available for most makes of D.C. Welders. *Write for folder; include name and model of your welder.*

Mullenbach

Electrical Manufacturing Co.

2300 East 27th Street, Los Angeles 58, California

Faster, Smoother
—non-porous welds in all positions

Maybe some E-6010 electrodes are hard to handle. But not the Hobart "10". You'll find that this new and versatile all-position electrode gives you real welding ease—PLUS—deep penetration, high tensile strength and ductility, quick and easy slag removal, a stable arc, and non-porous welds.

The Hobart "10" is widely used in structural work, ship building, pipe line construction, etc. Its penetrating arc makes it ideal for welding galvanized plates.

Yes, the Hobart "10" is years ahead of any electrode you may be using. But don't take our word for it. Instead, write us today for complete information and free samples to try on your next job. You'll be glad you did.

Overhead weld in 3/8-in. plate welded with Hobart No. 10 electrodes.

Vertical fillet weld in 3/8-in. plate welded upward with Hobart No. 10.

Whatever the position . . . the Hobart "10" gives you better, faster welds at lower cost.

HOBART BROTHERS COMPANY
Box U-522, Troy, Ohio
"One of the world's largest builders of arc welders"

Simplify all your welding by using HOBART ELECTRODES

NEW PRODUCTS

(Continued from page 56)

High-RPM Weld Grinder

270 The "Diskette," a new 8,000 rpm disk grinder is only 9½-in. long and weighs 4½ lb. Designed for welding shops and foundries, it can be easily operated in close quarters with only one hand. Outside diameter is 2¾ in. for easy grasping.

It is powered by a 110-volt a-c/d-c motor and is air-cooled by a fan in the aluminum housing. Three grinding disks are furnished with the tool. Optional equipment includes an aluminum safety guard, rubber disk adapter for recessed aluminum oxide wheels, collet chuck to hold files, cutter and a bench stand for conversion to table use.

BALMAR CORP.

* * *

Pipe Cutting Machine

271 USING a new template maker and "pipe scalloper," laterals for fabricated piping systems can be made in 10 to 15 minutes. Company claims the two devices will make laterals from piping varying from 2 to 12 in. in diameter to fit piping up to 24-in. diameter.

The Stratford template maker comprises a V-groove support for positioning an 18-in. length pipe of the desired diameter and a circumference arm. By making three settings and marking a line on a piece of thin sheet inserted in the pipe, a template is drawn. The template is cut out with tin shears—total time is 10 min.

The 18-in. length of pipe used to make the template and the template itself are then placed in the flame-cutting machine to serve as guides. The edge of the lateral cut can be a straight 90-deg, says the manufacturer, or at any bevel. It can also be made so that the high side of the lateral has little or no bevel and the low side a pronounced bevel.

Finished laterals on 12-in. pipe can be cut in 2 minutes, it is said, with an excellent fit into the header, so that the welders have an easy time.

HAROLD DESSAU, INC.

STOP Perspiration Hazards!

Hot weather means perspiration, discomfort, often the slowing down of work and loss of valuable time.

Every summer an increased number of employers largely overcome this perspiration hazard by providing employees with low-cost, felt or leather sweatbands, which absorb perspiration before it has an opportunity to create discomfort by running into the eyes. Here are three styles of sweatbands especially designed for hot weather.

No. 400—"Absorband" made of the finest obtainable absorbent white felt, treated to absorb a great deal more perspiration than ordinary felt. When saturated with perspiration, it can easily be rinsed in water, wrung out, and it is again ready for use. The felt fits on the forehead and is kept in place by a flat elastic band. Low cost permits liberal use.

No. 442—Helmet sweatband made of genuine sweatband leather, padded with felt. Can quickly be attached to any helmet or Face Shield headgear having a 1¼" band. Packed in individual envelope. You yourself would not wear a hat without a sweatband. Why ask your workmen to wear helmets or face shields without a sweatband—especially during the hot weather?

No. 443—Helmet sweatband. Fits ⅞" headband. Otherwise the same as No. 442.

Order "Absorband" felt sweatbands for general use, and Helmet sweatbands for welding helmets and face shields having a headgear. Be sure to specify the width of the band when ordering helmet sweatbands.

Order from your dealer or write us direct.

SELLSTROM MANUFACTURING COMPANY
Sellstrom Safeguards Your Eyes and Face
626 North Aberdeen Street, Chicago 22, Ill.

Stop
LOSING MONEY!

Use the ANZICK
SLIP-ON
SOLDERING TIP

★ ELIMINATES TANK OXYGEN
★ ELIMINATES BUCKLING • WARPING
★ USES HALF THE ACETYLENE
★ FITS ANY WELDING TORCH

The Anzick Slip-On Soldering Tip assures perfect soldering in half the usual time. Profitable soldering at half the usual cost. Used in Body Shops everywhere. Write for Literature!

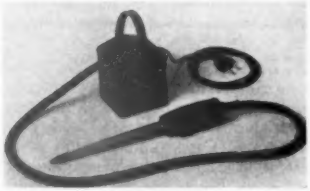
ANZICK MANUFACTURING CO.
23675 MOUND RD., VAN DYKE, MICH.

Small Positioner

272 A CAM-ACTING vise mounted on a Wilton "Junior Powrarm" is said to be an efficient fixture for welding, soldering and other assembly tasks. Up to 24 lb work weight can be handled in the vise. A convenient knob controls a pressure pad under the swivel ball. Motion in a 360-deg horizontal plane, 180-deg vertical plane and 360-deg axial plane is possible. Maximum jaw opening of the cam-acting vise is ⅜-in.

WILTON TOOL MFG. CO.

* * *



Solder Iron Control

273 A SPECIAL transformer on a new Swiss soldering iron enables the operator to eliminate preheat time on the iron if he chooses. For light-duty cycle jobs, where the iron is not in use for relatively long periods, the operator selects the transformer setting that keeps the heating coil de-energized while soldering isn't being done. When soldering is to be resumed, a special starter button is pushed to bring the heat up to operating temperature in 10 seconds.

For heavy-duty-cycle jobs, where the iron is at work almost constantly, the alternate transformer setting is used, so that about ⅛ the operating temperature is maintained in the coil even at rest. When the starter button is pushed in this case, operating heat is reached almost immediately. Iron and transformer together weigh about 6.3 lb.

FR. KNOBEL, ENNENDA - GLARUS, Switzerland.

—McGraw-Hill World News

Weld with Wagner
ELECTRODE HOLDER
Gives long trouble-free service because it cools more readily, due to its patented channel construction. Designed for Welders by a Welder. This is one among many exclusive WAGNER features.
See Your Welding Supply Distributor
GROUND CLAMP
Practical engineering producing a ground clamp best suited for every Welders need. Enclosed spring, rugged construction with spring adjustment. Use WAGNER clamps to complete your welding circuit.

Wagner Manufacturing Co. JACKSON, MISSOURI

Four times the life of ordinary regulators is guaranteed by exclusive four-seat construction. Each seat may be used successively – adjusted simply. No special tools or mechanical skill is required to maintain *any* part of the MECO regulator.

SAF-T-CHEK VALVES

This exclusive MECO construction provides insurance against seat or diaphragm failure. Built-in, self-actuating SAF-T-CHEK valves prevent damage to equipment from careless handling.

BOLTED DIAPHRAGM NEVER PUCKERS

Absolutely uniform pressure and flexibility is secured by *bolting* special alloy diaphragm – instead of conventional screw fastening which puckers diaphragm fibres. Diaphragm should last the life of the regulator.

Close yoke between diaphragm and multi-seat block insures transmission and correction of tiniest pressure variations providing constant and uniform pressure.

Meco *ASK YOUR MECO DEALER FOR FURTHER INFORMATION*

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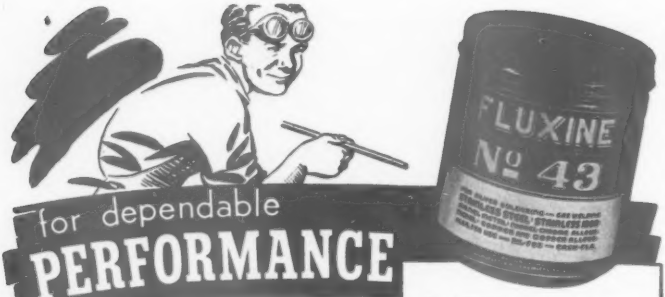

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277 COLD-drawn steel rods 36-in. long come with precision cut threads and are readily cut to length or heated by blowtorch to form U-bolts, eyebolts, etc. Called "Redi-Bolt," it is useful to construction men, weldors, plumbers, blacksmiths, etc. Redi-Bolt.

* * *

278 HOLLOW chambers in a malleable metal "safety" hammer are corrugated. Under continuous heavy pounding, corrugations slowly fold up and retard any external mushrooming of the hammer head. Custanite Corp.

* * *

279 ELECTRO-physical removal of minerals in water cooling systems is claimed for "Hydrotron" process. It consists of a bronze pipe assembly and an electrical control, both mounted on the piping system. Heller Laboratories.

* * *

280 COMPACT simplicity is claimed for the "MeF" universal camera microscope with a built-in camera and a magnification of 4.5 to 2,200 diameters. WILLIAM J. HACKER & CO., INC.

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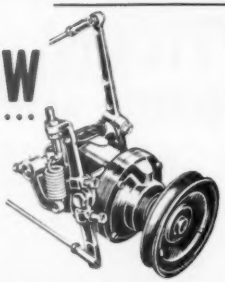

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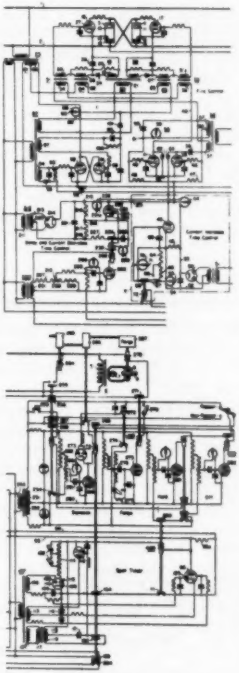
From the Patent Office

No-Spitting Welding Control

2,590,582. CLARENCE B. STADIUM, Buffalo, and WILLIAM E. LARGE, Tonawanda, N. Y. Assigned to Westinghouse Electric Corp., East Pittsburgh, Pa. Filed June 21, 1949. Granted March 25, 1952.



This patent refers to a system for reducing spitting during spot welding of oxide coated metal. The spot welding requires predetermined welding current and predetermined forge pressure. Devices are provided for passing an initial preheating current less than the welding current through the workpieces. Other mechanisms apply a greater forge pressure than predetermined welding pressure during the flow of preheating current. After a certain preheat period, current is increased to the welding level and the forge pressure is reduced to the predetermined welding force.

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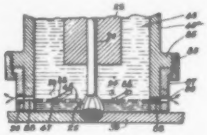
Shielded Arc Welding

2,590,084. ARTHUR A. BERNARD, Chicago, Ill. Assigned to National Cylinder Gas Co. Filed Aug. 6, 1945. Granted March 25, 1952.



This patent refers to an improvement for arc welding processes wherein a space around the arc is enclosed to confine arc-generated gases. A different gas that is lighter than the arc-generated gas is introduced into the space at a level above the lower end of the arc. The space is vented continually at a level above the lower end of the arc. Introduction of the light gas is correlated to the venting to cause the arc-generated gas and the light gas to form separate bodies with an interface at the level mentioned. By varying the venting level the interface is shifted along the arc to thereby vary the rate of metal deposition from the electrodes.

* * *

Stabilized Inert-Arc Tungsten

2,586,516. JAMES D. COBINE, Schenectady, N. Y. Assigned to General Electric Co. Filed Feb. 12, 1949. Granted Feb. 19, 1952.

This patent refers to a non-consumable inert-gas-arc-welding electrode made of tungsten. The electrode is capable of starting an arc instantly and maintaining a stable arc at temperatures below the incandescent temperature of tungsten because of an additive. The latter is a zirconium oxide compound situated at the arc terminal of the electrode for forming a stable cathode spot.

* * *

Special Brazing Flame

2,587,296. ALBERT JEAN DUCAMP, Chaville, France. Filed Oct. 31, 1949. Granted Feb. 26, 1952.

Patent covers a process for improving gas brazing and welding flames by adding chemicals to them. It comprises introducing into the torch operating gases certain complexes formed by an alkil glyceroborate and methylglyceroborate dissolved in methyl alcohol.

* * *

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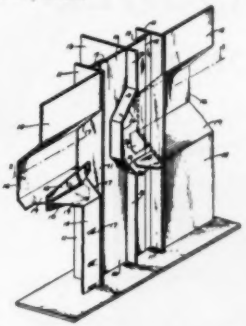
Welded Ship Bulkhead

2,585,980. JOHN VASTA, Washington, D. C. Filed June 26, 1946. Granted Feb. 19, 1952.

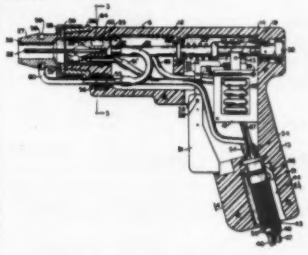


This patent refers to a bulkhead construction for a ship. Specifically, it covers a vertical bulkhead extending longitudinally of the ship. The bulkhead has horizontal corrugations, each having a vertical part that joins a pair of converging parts. A vertical I-beam intersects the bulkhead and is welded to it with the flanges of the beam abutting opposite parts of the bulkhead. A pair of vertical brackets are disposed on each opposite side of one of the converging parts approximately in the plane of the web of the beam. It is also at the midpoint of the said converging part and is welded to it and to the flange of the beam.

* * *

Arc Spot Welding

2,586,140. NELSON E. ANDERSON, Scotch Plains, N. J. Assigned to Air Reduction Co., Inc., New York City. Filed July 30, 1948. Granted Feb. 19, 1952.



A newly granted patent covers an apparatus for spot welding metals with an electric arc. A gun-like electrode holder has a nozzle and a pistol grip attached to the barrel. The electrode holder proper is slidably supported in the barrel. A trigger on the pistol grip is attached to the electrode holder so that when the trigger is pulled the holder is advanced.

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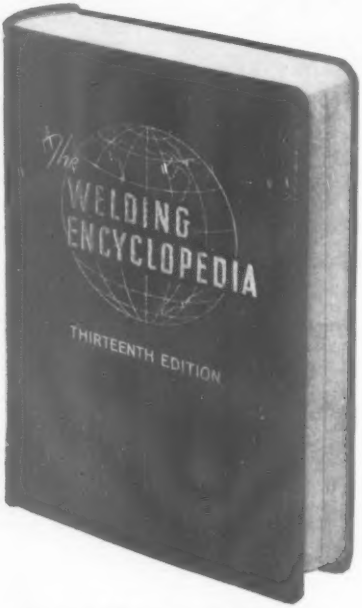

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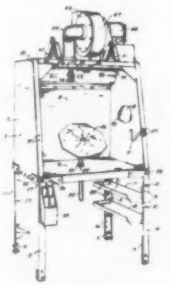
Welding Cabinet

2,590,577. Richard Ruemelin, Milwaukee, Wis. Filed May 20, 1949. Granted March 25, 1952.

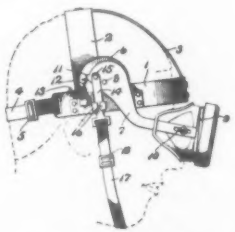


A newly patented enclosure for production welding has top and rear walls and an open front. A baffle is fastened across the width of the rear wall. This baffle extends forward and upward to form with the top and rear walls an auxiliary chamber. There is an opening in the baffle to provide communication between the auxiliary chamber and the rest of the cabinet. The enclosure has an exhaust vent communicating with the auxiliary chamber. An exhaust blower is connected to the vent.

* * *

Weldor's Eyeshield

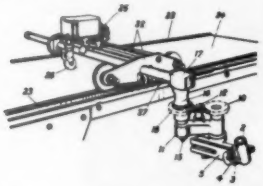
2,588,553. Arthur McWethy, Grand Rapids, Mich. Filed May 17, 1948. Granted March 11, 1952.



A newly patented eyeshield for weldors is mounted on a circular headband that has a supporting loop. The loop is attached to the headband at opposite sides of the head and goes over the top of the head. A pair of arms are pivotally mounted on opposite sides of the band close to the connections of the loop. A goggle extends between the front end parts of the arms. A strap goes under the weldor's chin. Its ends are connected with each of the arms rearwardly of their pivots and substantially in alignment with the loop.

Adjustable Torch Holder

2,587,461. GILBERT GATIMEL, Paris, France. Assigned to L'Air Liquide. Filed June 11, 1948. Granted Feb. 26, 1952.



This patent refers to a torch holder on a flame-cutting machine used to make sheet metal shapes. A traveling carriage has an arm provided with a spindle so that it is at right angles to the cutting surface. A combined support for an oxyacetylene torch is provided with a spindle journalled at the end of the previously mentioned arm, and at right angles to the surface. A stationary gear is mounted on the carriage concentric with the pivoting arm spindle. Another gear is secured to the combined support spindle. An intermediary gear is adapted to freely rotate on the arm and mesh with the other gears. This turns the combined support relative to the arm about an angle equal to the rotation angle of the arm, but in a reverse direction.

* * *

New Arc Welding Method

2,587,251. PAUL C. VAN DER WILLIGEN, Eindhoven, Netherlands. Assigned to Hartford National Bank and Trust Co., Hartford, Conn. Filed Jan. 10, 1948. Granted Feb. 26, 1952.

This patent was granted for a new method of electric arc welding in which slightly spaced workpieces are to be joined. The new method includes spacing the workpieces properly and then placing a non-gas-evolving, semi-conductive, slagging solid in the gap between them. This solid has the following composition by weight: 20% calcium oxide, 13% calcium fluoride, 12% finely powdered glass, 2% ferro-manganese, 3% ferro-silicon, 2% ferro-titanium and 50% finely powdered iron.

This compound establishes a conductive contact between the workpieces so that when an electric current is passed between them an arc is formed. The arc burns through the slagging solid for a short time, depending on the size and shape of the solid. The workpieces are then moved into contact with each other and the current is interrupted.

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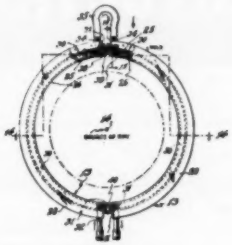
X-Ray While Welding

2,587,056. ARCHIE K. MCELROY, Springfield and LOUIS C. MCNUTT, Scotch Plains, N. J. Filed Dec. 21, 1949. Granted Feb. 26, 1952.

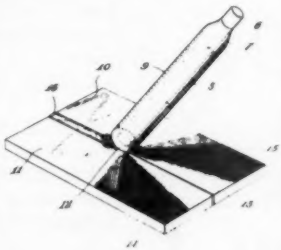


This patent describes a process for detecting blowholes and porosity in welds while they are still hot. A source of radiation such as radium is placed on one side of the weld metal. A hollow jig is placed on the opposite side of the metal with a radiographic film on the outer surface of the jig. A cooling fluid is passed through the jig so that pictures of the weld can be taken even when the weld metal and surrounding area are still at 1,000 F.

* * *

Contact Arc Welding

2,587,195. WILLEM MOERMAN, Eindhoven, Netherlands. Assigned to Hartford National Bank and Trust Co., Hartford, Conn. Filed Feb. 17, 1949. Granted Feb. 26, 1952.



A new contact arc welding process utilizes a coated electrode that has a longitudinal slot in the coating that does not quite reach the core wire. The coating melts rapidly during welding to form a crater at the arc end. An edge of the contact welding electrode is kept in touch with the metal workpiece as it traces along the path of the weld to be made. The slot in the electrode coating is kept facing the path to be welded. Light rays from the arc in the crater escape via the groove to illuminate the weld joint so that it may be accurately followed.

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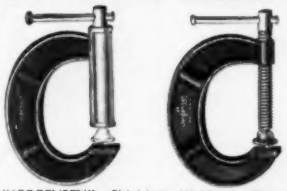
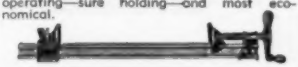


"JORGENSEN" Shielded Welders' Clamps eliminate damage from "spatter", and are low-priced. "Regular" "C" clamps are available too, if preferred.

"PONY" Clamp Fixtures make ideal bar clamps on any length of black pipe. Fast operating—sure holding—and most economical.



"JORGENSEN" Steel Bar Clamps are designed for the severe requirements of welding service; exclusive "multiple disc clutch" makes for instant adjustment—economy. The trade-mark "JORGENSEN" or "PONY" on your clamps is assurance of utmost satisfaction in service—specify and insist upon them from your supplier. FREE CATALOG ON REQUEST.

ADJUSTABLE CLAMP COMPANY

"The Clamp Folks"

426 N. Ashland Ave., Chicago 22, Ill.

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Advertising men agree – to do a complete advertising job you need the double effect of both Display Advertising and Direct Mail.

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Some people have a wrong conception of Direct Mail. There's no hocus-pocus to it—there's no secret formula—nor is there need for an extensive department to plan and execute your mailing program. You don't even need your own mailing lists.

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In view of present day difficulties in maintaining your own mailing lists, this efficient personalized service is particularly important in securing the comprehensive market coverage you need and want.

Ask for more detailed information today. You'll be surprised at the low over-all cost and the tested effectiveness of these hand-picked selections.

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PUBLISHING COMPANY, INC.
330 WEST 42nd STREET, NEW YORK 18, N. Y.

WHERE TO BUY

6714 Bryn Mawr Ave.

ALADDIN ROD

for Welding Zinc Base Metals and Brazing Aluminum

ALADDIN ROD & FLUX MFG. CO.

GRAND RAPIDS, MICHIGAN

SEARCHLIGHT SECTION

(Classified Advertising)

EMPLOYMENT: BUSINESS: **"OPPORTUNITIES"** :EQUIPMENT :USED OR RESALE

UNDISPLAYED —RATES— **DISPLAYED**

(Not available for equipment advertising)

90c a line, minimum 3 lines. To figure advance payment count 5 average words as a line.

Position Wanted and Individual Selling Opportunity advertising rate is ½ the above rates payable in advance.

Box Numbers—Count as one line.

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Individual Spaces with border rules for prominent display of advertisements.

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An Advertising inch is measured ⅞" vertically on one column, 3 columns—30 inches—to a page.

New Advertisements: Address 330 W. 42 St., N.Y. 36, N.Y., for June issue closing May 15th.

REPLIES (Box No.) Address to office nearest you
NEW YORK: 330 W. 42nd St. (36)
CHICAGO: 520 N. Michigan Ave. (11)
SAN FRANCISCO: 68 Post St. (4)

SELLING OPPORTUNITY OFFERED

WANTED: SALESMAN to handle Nationally advertised gas welding and cutting equipment. Many territories open. $100 per week to start. Extremely large commission earnings possible. Must have previous experience with large distributors or welding supply houses. Write SW-4046, Welding Engineer, stating your qualifications.

POSITION WANTED

PRACTICAL WELDING Engineer desires permanent position in Supervisory, Quality Control or Sales capacity with pressure vessel or plate fabricator. Twenty-three years in welding industry, seven years supervisory and six years quality control. Experience covers submerged arc, manual arc, inert-gas and gas welding and burning, all steels, aluminum and alloys. PW-3768, 520 N. Michigan Av., Chicago 11.

SELLING OPPORTUNITIES WANTED

MANUFACTURERS REPRESENTATIVE: Looking for companies, who manufacture welding items, to represent in State of Michigan and Ohio. 15 years in the welding field and resident of Detroit. Likes to sell and have good references. RA-3751, Welding Engineer.

SALES REPRESENTATION Wanted—Salesmen calling on welding supply houses wanted to introduce new line. Good opportunity. Write George M. Acker Co., 3833 Wilshire Blvd., Los Angeles 5, Calif.

WELDING FOREMAN

For plate and structural pressure vessel manufacturer, using Unionmelt, Heliarc, Sigma and Metallic arc processes. Steel and aluminum are primary metals; also some stainless, monel, and other non-ferrous metals. Must be an excellent operator capable of instructing on-the-job training operators. We are a well established progressive company, in a Mid-Western location.

Write, giving experience, personal data, and salary requirement, **P3964 Welding Engineer. 520 N. Michigan Ave., Chicago 11, Ill.**

WELDING ENGINEER—SALESMAN

For well established and progressive supply house. Best opportunity in the welding field.

Write giving experience, personal data, references and income requirements.

GIBSON WELDING SUPPLIES
E. 218 Trent Avenue, Spokane 2, Washington

SALES ENGINEERS WANTED:

Various locations. Work with distributors selling hardfacing welding rod. Practical or formal training in welding field desired. Growing division of large company with excellent opportunities.

SW 3792, Welding Engineer
520 N. Michigan Ave., Chicago 11, Ill.

SALES ENGINEER

Minimum 5 years experience. Practical ability in gas, arc, heliarc welding, and silver brazing. A large, well established Chicago distributor is interested in your future. Salary, bonus, and car allowance.

Send resume to:

SW4025 Welding Engineer
520 N. Michigan Ave. Chicago, Illinois

WANTED: Contracts or subcontracts. Modern welding shop. Portable and stationary equipment—certified welders—located main highway near Baltimore. Desire permanent welding contract with large manufacturer—low production costs. Excellent transportation facilities available. Write **CW-3730, Welding Engineer, 330 W. 42nd St., New York 36, N. Y.**

FOR RENT—Fifty Shieldarc stationary welders 3 Ph. 440 V. A.C. 60 C. Will rent all or part on a monthly or yearly basis at extremely low cost. Will change over to 220 V. if needed. All machines in good working order. **FR 3726, Welding Engineer, 330 W. 42nd St., New York 36, N. Y.**

A. C. WELDER BARGAINS

1000 Amp. Glen Roberts 440 volt	$275.00
550 Amp. Smithway 440 volt	$125.00
400 Amp. Westinghouse 220/440	$200.00
300 Amp. Hollup 220/440 volt	$175.00

HARRIS MACHINERY CO.
501 30th Ave. S.E. Minneapolis 14, Minnesota

STAINLESS STEEL ELECTRODES

13,000	3/32"	Page	18-8
1,000	3/32"	Arcos	19-9
4,050	1/8"	Airco	18-8
7,000	1/8"	Page	18-8
9,500	1/8"	Arcos	19-9
2,000	1/8"	McKay	19-9
31,250	1/8"	Alloyrod	19-9
3,000	5/32"	Page	18-8
9,550	5/32"	Arcos	19-9
15,000	5/32"	McKay	19-9
7,500	3/16"	McKay	19-9
5,000	3/16"	Racolay	19-9
4,000	3/16"	P 5-H	19-9
1,300	3/16"	Sureweld	19-9
3,135	1/4"	Lincoln (AR-W1)	19-9

1,000,000 lbs. Surplus Mild Steel Electrodes

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INDUSTRIAL AIR PRODUCTS CO.
3200 N. W. Yeon Avenue
Portland 10, Oregon
Ca 9231

OXWELD CM-15s, Nat. 5s, Harris K's, Gaso S-24. AIRCO Oxy-graph, Camographs, Radiagraphs. SEAM WELDER, Progressive 150KVA, New. SPOT WELDER, National, 40 KVA for Brass and Stainless BRONZE, STAINLESS, AMPCOTRODES. NO. 12 LENSES, ELECTRODE HOLDERS.
RALL SUPPLY CO. 6 E. 39th St., NYC 17

COPPER LUGS FOR CABLE

4000 Cable Hole 3/4 Lug Hole 9/16
7500 Cable Hole 11/16 Lug Hole 1/2

SAMPLES ON REQUEST

CORP BROTHERS
1 Brook Street, Providence 3, R. I.

WELDING HOSE

Oxygen, acetylene, or air hose, 25' length, ¼" I. D. with couplings—$2.50 per length. Parcel Post Prepaid. Rated firms: net 10 days. Others: Cash with order or C.O.D.

Satisfaction guaranteed.
Other types of hose, prices on request
Saxon Rubber Company
438 Larimer St. Denver 4, Colo.

IN 100-LB. LOTS, F.O.B. SCRANTON SALE OF SURPLUS ELECTRODES

Ampco-Trode, 3/16" 10 Alum. BR	70c-lb.
Arcos, ⅛" Chromang 19/9 MN Type, 307 Stainless	50c-lb.
Murex, 5/32" 18/8 MO Stainless	70c-lb.

Scranton Welding Supply Company
1301 Wyoming Avenue Scranton, Penna.

40 KW SCIAKY

ALUMINUM SPOT WELDER
36" Throat
FITZPATRICK & WALSH
2439 N. 9th St., Philadelphia 33, Pa.

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"Searchlight advertisers almost invariably report prompt and satisfactory results.

BE CONVINCED — send us your advertisement TODAY.

Address Classified Advertising Division

Welding Engineer

330 W. 42nd St., New York 36, N. Y.

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(Classified Advertising)
H. E. Hilty, Mgr.

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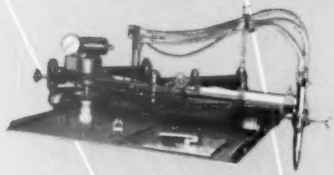

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Plants
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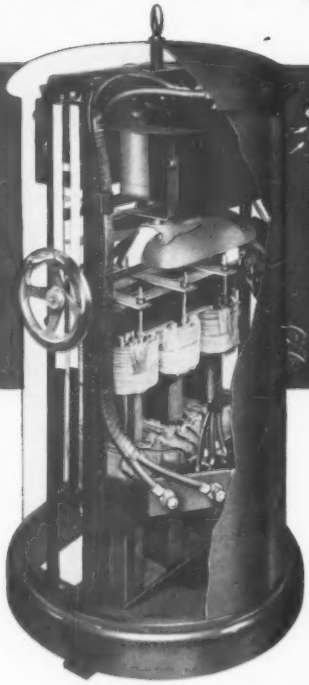
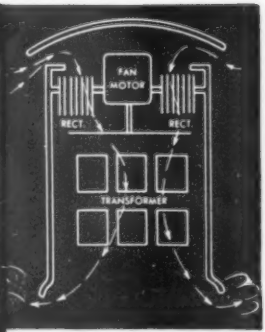
THE BURDOX LINE INCLUDES • WELDING AND CUTTING EQUIPMENT AND MACHINES • SOLDERING AND BRAZING OUTFITS • REGULATORS AND GAUGES • INDUSTRIAL GASES • HOSE AND CABLE • ACETYLENE GENERATORS • GOGGLES AND HELMETS • LENSES AND FACE SHIELDS • RODS AND FLUXES • CYLINDER TRUCKS

The only rectifier welder designed to eliminate stack failure!

High-velocity, DOWNDRAFT VENTILATION keeps rectifier stacks cool in the

A.O.SMITH D.C. WELDER





Sectional view of the new A. O. Smith Rectifier-type D.C. Welder and diagramatic drawing show ideal location of stacks and circulation of high-velocity air through the welder.

Available in 200-, 300-, and 400-amp. models.

Location of rectifier stacks in the flow of cool, clean air entering the top of the A. O. Smith D.C. Welder assures positive cooling of these most critical parts.

Wind tunnel design, proved for more than a decade in A. O. Smith Heavy Duty Welders, blasts cool air down and over rectifier stacks. This prevents stack failure. In addition, clean rectifier stacks and clean glass-insulated heavy copper transformer coils are assured. Maintenance down-time is thus avoided.

This marked advance over conventional rectifier-type welders solves overheating problems, ends limitations on duty, avoids introduction of floor dirt and eliminates rectifier stack failure.

Other refinements provide effortless amperage control, universal application and economical operation. They, too, are exclusive in this advanced design, rectifier-type, D.C. Welder.

A.O.Smith
WELDING PRODUCTS

Made by Welders . . . for Welders

For complete information, write direct to: A. O. Smith Corporation, Welding Products Division, Dept. WE-552, Milwaukee 1, Wisconsin